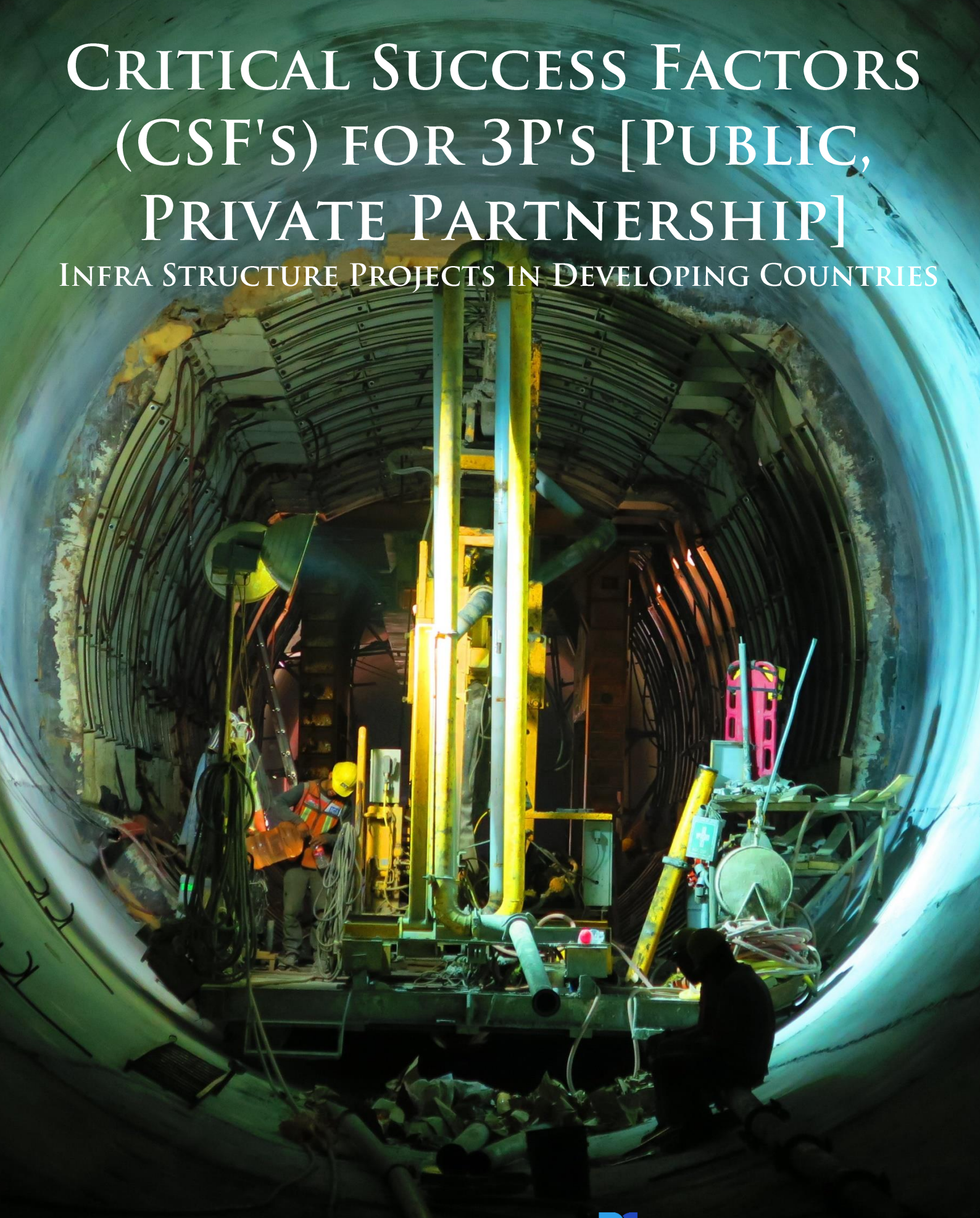
Critical Success Factors (CSF's) for 3P's [Public, Private Partnership]

Infra Structure Projects in Developing Countries



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Critical Success Factors (CSF's) for 3P's [Public, Private Partnership]: Infra Structure Projects in Developing Countries

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DEDICATION

I am lucky enough to have been given the supportive gift of amazing people in my life, without all of whom, this work would not have been completed. First of all, I would like to thanks to Almighty Allah, without His mercy, I would not be able to achieve what I have today.

I dedicate my dissertation work to my parents, teachers and family members. A special feeling of gratitude to my loving parents, whose words of encouragement and inspiring me from a young age the belief that I Can; I would also like to pay my exceptional thanks to my brothers, sister, uncle (Prof. Hafiz Muhammad Tufail) and family members who have supported me throughout the process and for being more than the sky to me.

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Engr. Muhammad Akbar

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Engr. Muhammad Akbar

ABSTRACT

Since the early 1990s, Pakistan is formally working on public-private partnership (P3) procurement model for the uplift of her economic growth and provision of needed infrastructural facilities to the public. Initially, telecom and power sectors only experienced P3 procurement but since 2004, the popularity of P3 projects in various other sectors has been on the rise from government perspective due to current fiscal constraints, global economic recession, increased urbanization and urge for needed infrastructural facilities by the public.

P3 Procurement is considered to be complex in Pakistan due to the presence of diverse geographical and social behavior across the country and lack of P3 experience and knowledge by the government officials and private sector dealing with the involvement of heavy capital over the long duration with the achievement of different interests by various stakeholders. Therefore, for the successful implementation of P3 projects across the country without disputes and losses during concession period, reliable and effective risk management is needed at all levels during the initial phase of the P3 project and very few empirical studies have been carried out to address this important issue.

This research deals with the assessment of major risk factors associated with P3 construction projects in Pakistan and their preferred allocation among public and private partners. Based on an extensive literature review, interviews and considering the likelihood of occurrence and impact of various risks associated with P3 construction projects in the region, forty two (42) risk factors comprising seven major categories i.e. construction/management, political, financial, operational/transfer, legal, relationship, natural/social were identified for the research study. An empirical questionnaire survey was carried out across the country to know the ranking and preferred allocation of selected risks pertaining to

P3 construction projects. A total of 250 questionnaires were distributed among the public, private and academics sectors, out of which 151 valid responses were received across the country for the data analysis. Mann-Whitney U Test is used to check the level of significant difference in perception among the public, private and academics sectors.

The results across the country indicate that five top-ranked risks accessed by the public, private and academics sectors are *political instability, corruption, and bribery in government offices, strong bureaucratic influence, poor law and order situation, and complex government approval system.* Four out of five top-ranked risk factors belong to political category whereas one belongs to the legal category. Mann-Whitney U Test has revealed that there is the considerable significant difference between the perception of public, private and academics sectors in the ranking of risk factors, which may be due to their differences of interests/perceptions towards the P3 concept in Pakistan which is still at the preliminary stage. However, no difference of opinion is observed in the ranking of "Top Fifteen Risk Factors".

For risks allocation, empirical results indicate that respondents allocated 15 risk factors to the public sector, 12 to the private sector and 15 risk factors were proposed to be shared between both the public and private sectors. *No risk factor was allocated to private sector among the top fifteen risk factors by the respondents*, which show public sector responsibility in the handling of top priority risk factors towards the successful implementation of P3 construction projects.

This research study enables government and international/local private sector construction companies to better understand the impact and significance of various important potential risk factors associated with P3 constructional projects in Pakistan. At the same time, it also highlights the preferences of public and private sectors in the handling of these risk factors. The research work also helps concerned government

departments and institutions for better future risk planning/management on P3 constructional projects and adjusting their strategies accordingly to attract maximum foreign investors in the country to achieve better value for money for the public.

CHAPTER 1

Public Private Partnership (P3) in Pakistan

1.1 Overview

Since the early 1990s, *Public-Private Partnership (P3)* procurement model is playing a significant role in the development of infrastructural facilities in Pakistan. Initially, only power and telecommunication sectors launched few major social sector projects under P3 in the country and for that, the Private Power and Infrastructure Board (PPIB) was created in 1994. In 2003, considering the globalized expanding popularity of the P3 model, Government of Pakistan also enhanced its role to other sectors like trade, transportation, education, agriculture, health, sewerage treatment, and tourism etc. In 2005, Pakistan officially recognizes the importance of private sector involvement in national infrastructural development through the medium-term development framework (MTDF, 2005-2010) program and sequel to it, infrastructure project development facility (IPDF) was created in 2007 under the ministry of finance to look after the affairs of P3 in the country.

Pakistan as per World Economic Forum Survey is ranked 67th in the world out of 125 countries in the provision of basic infrastructural facilities to the public and it requires heavy investment in this sector i.e. approximately US$ 110 billion over the next 5 years (2010-2015) for the country's sustainable economic growth to compete with the global/regional challenges. Last year, as per Ministry of Finance statistics, the country only spent about US$ 5 billion through Public Sector

Development Program to improve the infrastructural facilities, so there is huge potential in the country for private investors to work with the government in achieving her financial, economic and social dreams through P3 procurement.

Pakistan construction sector, which majorly contributes towards the sustainable national economic growth by the creation of indirect jobs, employment and investment opportunities for approximately 45 building material industries across the country presently requires heavy private investment for its considerable growth. As per state bank of Pakistan report 2011, construction industry contributed only 2.4% of GDP in 2011 as compared to 7% in the year 2007 and decline rate of 10.8% was observed which is highest in last 37 years. Planning Commission of Pakistan has an estimated $180 billion investment in the development of physical infrastructure across the country like the construction of buildings, motorways, roads, canals, and railways etc. by 2015, which are not possible only through government budgetary resources, therefore, the government will be looking towards private investors for the accomplishment of desired projects.

Besides above mentioned P3 recognition and opportunities in Pakistan, still, there are considerable reservations and resistances from the government, judiciary and public side for the undertaking of P3 projects in the country. They want to have a fair and clean system/approach in the undertaking of P3 projects in the national interest. Therefore presently foreign and domestic private investment is at a very low level in the country, which needs to be enhanced through detailed and sincere planning and management.

For the successful execution of any P3 project which involves huge investment by the private sector over long duration with multiple interests and to minimize the chances of losses and disputes at a later stage, it is very necessary by the stakeholders to plan all modalities of P3

during initial phase through detailed contract documents. This not only ensures the building of confidence level among investors but also exhibits government potentially in the handling of national interests at minutest level. One of major factor to attract the investors and financers towards the successful development and execution of the P3 project is assessment and allocation of risks associated with the P3 project because risk significance dictates the investor and government to look on the success perspective of any P3 project. Therefore the failure and success of any P3 project largely depend on the critical identification, quantification and assessment of risks in a professional way.

P3 construction experience in Pakistan is not that healthy, Occurrence of disputes during construction of Islamabad - Peshawar motorway between Turkish firm and government, at least three years delay on the completion of the Neelum-Jhelum hydropower project, two years delay on the signing of contract for the construction of Karachi- Hyderabad motorway, Slow progress of work by Chinese coal mining firm at Thar Coal Project, legal disputes for last four years on the Reko Diq gold and copper mines are some of examples of unsuccessful stories linked with P3 Constructional projects across Pakistan. Therefore there is a need to understand the value of risk assessment in Pakistan by the government for the success of P3. Pakistan is ethnically and geographically very diverse country, so there is a need to identify and assess the significance of various critical risk factors in a detailed way for the better understanding by the government and investors to effectively manage and mitigate them at right time. The above-mentioned reasons were the core of this study, which has made this research an important field for the improvement of the P3 atmosphere in Pakistan.

1.2 Sustainable Economic & Social Development

For sustainable economic and social development and considering the fiscal impediments being faced by the government in provision of growing infrastructural needs by the public, no one denies the role of P3 in future and similarly properly structured and legally covered P3 program will be required by the government to build the confidence level of foreign investors in the region. P3 procurement is quite different than others due to the involvement of multiple stakeholders investing huge capital over a long duration with different interests in mind for the success of the project. Pakistan has mixed experience of P3 construction projects. Therefore there is a need to understand the main factors which contribute towards the success of P3 projects in ethnically and geographically diverse Pakistan. One of major factor which builds the confidence of investor is the presence of reliable, practical and objective risk management strategy by the host government along with fair and justified risk allocation mechanism. This study also aims at identifying critical, practical and on-ground risk factors associated with P3 construction projects across Pakistan including all provinces and also finding of risk allocation perceptions among public, private and academics sectors. This will help government and private sectors to understand major critical risks in a more comprehensive way before undertaking a P3 project in various parts of Pakistan and similarly, it will make future researchers focus their attention on more specific risks for dealing with them in a comprehensive and detailed way.

1.3 Complexity of Problem

Over last two decades, Pakistan government has experienced mixed taste of success and failure related with P3 construction projects. Where there are success stories related with construction of M-2 motorway by M/S Daewoo and Lahore-Sheikupura-Faisalabad road by M/S LAFCO, still

there are many P3 constructional projects, which got abandoned, delayed or went under disputes like Thar coal mine, Reko Diq gold mine and construction of M-1 by M/S Byinder etc. There can be many factors leading to failure of these projects but one critical factor is common to all and that is lack of practical and reliable assessment of risks and their allocation strategy during the initial phase of P3 projects. M/S Byinder suffered due to a shortage of materials and communication gap risks at later stages which they did not cater for during the initial phase of the project. Similarly, many private firms faced huge financial losses due to poor law and order situation and political instability at project sites.

P3 construction project becomes quite complex due to the involvement of many stakeholders sharing huge capital over long concession period and private sector unfamiliar behavior with host country environments. During such situations, reliable and objective risks assessment and allocation becomes very necessary for the understanding of their significance at the initial phase of the project. This research study also focuses attention on the assessment and allocation of risks associated with Pakistan P3 constructional projects including all provinces.

1.4 Learning Objectives

Following are the identified objectives of the research study:

a. Identification of the major risk factors associated with P3 construction projects in Pakistan to gauge their effect, performance, and viability during the implementation of P3 constructional projects.
b. Assessment and allocation of P3 construction risk factors in Pakistan to understand their severity, ranking and allocation preferences in maintaining the effective risk management and mitigation

techniques on P3 constructional projects in the country.

c. To suggest necessary measures for effective and reliable management and handling of critical risk factors related to P3 construction projects in Pakistan.

1.5 Scope of this Book

The scope of this research will only be limited to the assessment of P3 construction project risks in finding out their ranking and proposed allocation among public and private partner across Pakistan.

1.6 Structure Building

Research Work is divided into five chapters. "*Chapter 1"* serves as the introduction to risks associated with P3 construction projects. How important these risks are? What effects do they create on P3 projects in Pakistan? "*Chapter 2"* describes the importance of P3 constructional projects and detail of various risks related to Pakistan P3 environments. It also briefs about risk allocation perceptions in P3 projects. *"Chapter 3"* describes the methodology of research work *"Chapter 4"* presents the data collected and carries out the analysis of results in relation to research questions. *"Chapter 5"* summarizes the findings and leads to the recommendations and conclusion.

1.7 Summary

This chapter covers the basic introduction of P3 in Pakistan and highlights the importance of timely assessment and allocation of various risk factors which may affect the successful implementation of P3 construction projects in Pakistan. The chapter also informs about the significance and objectives of the research study which will be conducted by keeping certain specific goals in mind.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Public-private partnership commonly referred as **"PPP"** or **"P3"** is rapidly becoming popular scheme across the world in the provision of infrastructural facilities like water supply, transport, solid waste management, energy, agriculture, mining and telecommunication etc to the public by the private sector which was previously thought to be the responsibility of a government. P3 combines the skills, innovations, ideas, experiences, and resources of both the public and private sectors in the development of attractive and reliable public facilities. What distinguishes P3s from other infrastructure provision arrangements is the special bundling of interests (risks and returns) between the public and private sectors. The fact that private capital, and in particular debt, is at risk to the performance of the private partner, is one of the strengths of the P3 structure. As per Cristina, *et al.,* 2006, the ownership and the financing-operation of the project belong to different partners.

The government usually holds a residual ownership right, while the private sector finances the construction and/or expansion of the facility, its maintenance, operates the facility, and collects the revenue for a given period, typically under a long-term contract. The government can also participate in financing or operation of the project, through guarantees, subsidies or other forms of financial and operational support. This feature differentiates the P3 contracts from traditional infrastructure financing (entirely public) or from full privatization (Cristina, *et al.,* 2006). The lenders act as a form of "performance police" to ensure that the project entity and its subcontractors perform the project agreement obligations. A technical advisor will be retained to monitor on a monthly basis the construction process and, subsequently, the operational phase of the project. Lenders will be motivated to take whatever steps are

necessary to fix a non-performing P3 because their ability to recover their funds is dependent on the private partner being paid, which in turn is dependent on satisfactory performance by the private partner (Timothy J. Murphy *et al.,* 2008). This enables governments to benefit from the expertise of the private sector and allows them to focus instead on policy; planning and regulation by delegating day-to-day operations *(World Bank, 2012)*. P3 projects are based on the assumption that both sectors have particular skills and characteristics providing each with advantages in undertaking certain tasks. Quite naturally this has created a widespread interest in the term P3 and it has become quite fashionable, both politically and socially (Thobani, 1999). In general, P3 is regarded as a general term covering all contracted relationships between the public and private sectors to produce an asset or deliver a service (Chan, 2011). Here P3 should not be confused with privatization; P3s are not privatization as under P3s accountability for the delivery of the public service is retained by the public sector whereas, under privatization, accountability moves across to the private sector. Worldwide investment in P3s from 1990-2011 has reached to US$ 1694 billion in the provision of infrastructural projects and major investment in telecommunication sector has been recorded over past two decades as shown in Figure 2.1 *(World Bank, IPID,2011)*. Energy is the second-highest sector in the world which attracted US$ 572 billion investment (34%) through P3. The transport sector is at number three in the world in attracting P3 investment of US$ 293 Billion.

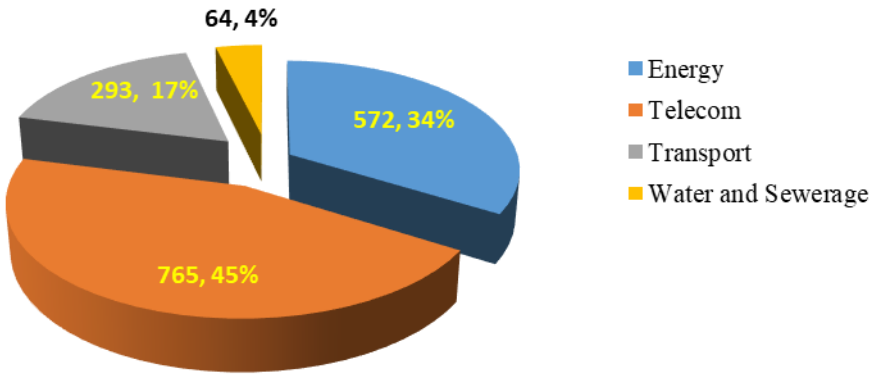

Figure 2.1: Global Investment in P3 Projects (US$ Billion), 1990 - 2011 (*Source: World Bank, PPID, 2011)*

P3 or Private Finance Initiatives (PFIs) originally arose in the United Kingdom (UK) during the late 1980s and early 1990s (Li, et al., 1999). The main aim of introducing PFIs was widening the privatization and contracting out policies to incorporate the provision of infrastructure and public services by a hybrid approach of combined public and private sector funding (Owen, *et al.,* 2006). Since their introduction, PFIs have become the UK government's preferred method of public infrastructure procurement. PFI investment in the UK has reached to US$ 83 billion in 712 projects over the last two decades (HM-Treasury UK Report 2010). In the world, maximum P3 projects i.e. 2,027 has been undertaken in the energy sector since 1991. Whereas maximum constructional P3 projects belong to the transport sector, in which total of 1331 constructional projects have been completed since 1991 around the world, out of which 707 belonged to road constructional projects as shown in Figure 2.2. Seaport and airport P3 projects are at number two and three in the world with the completion of 370 and 142 P3 projects respectively.

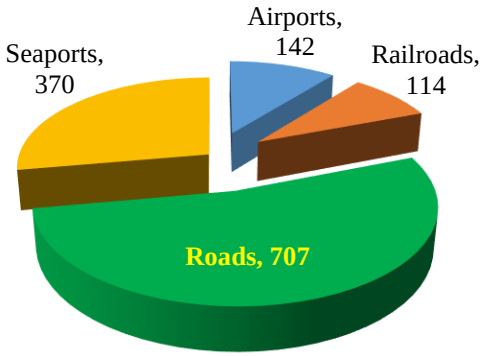

Figure 2.2: Global P3 Transport Projects (1991-2011)

(*Source: World Bank, PPID, 2011)*

P3 has also become an important procurement model in South Asia since 2006 onward as shown in Figure 2.3, where 78 P3 projects were completed in the year 2006 and this number reached at its peak during 2010, where 100 P3 projects were successfully executed in South Asia.

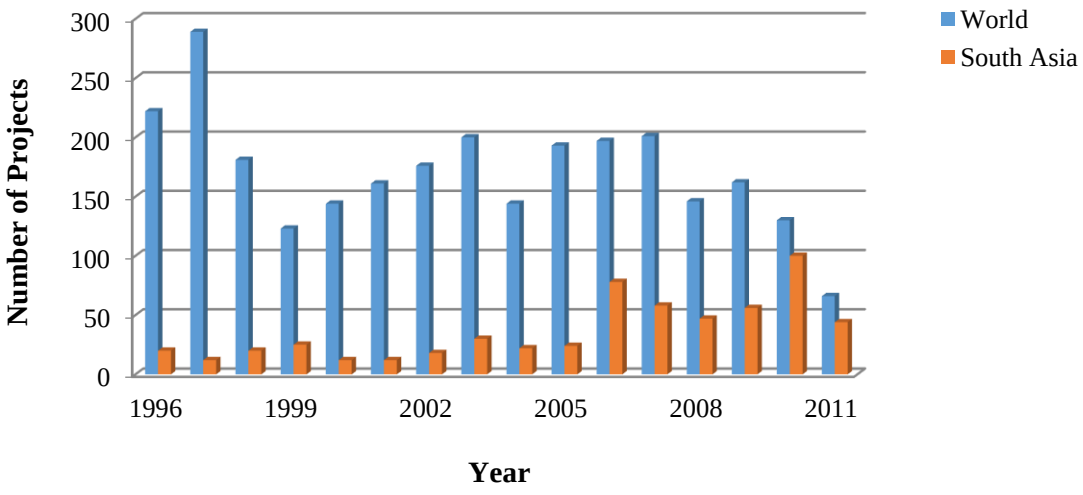

Figure 2.3: Comparison of P3 Energy and Transport Projects

(*Source: World Bank, PPID, 2011)*

2.2 Definition of P3

Universally there is no single accepted definition of P3, the instead wide range of definitions across the globe are available which varies in term of their meaning and wording from country to country and organization to organization. According to *HM-Treasury UK,* "Public-Private Partnerships are arrangements under the joint working of the public and private sector. In the broadest sense, P3 can cover all types of collaborations across the interface of public and private sectors to deliver policies, services, and infrastructure. Where the delivery of public services involves private sector investment in infrastructure, the most common form of P3 is the private finance initiative (PFI)". *The Hong Kong Efficiency Unit (2008)* suggested that P3s are collaborations in which the public and private sectors both bring their complementary skills to a project, with different levels of involvement and responsibility, for the sake of providing public services more efficiently. *Government of India, Ministry of Finance* states P3 as "Partnership between a public sector entity (sponsoring authority) and a private sector entity (a legal entity in which 51% or more equity is with private partner/s) for a creation and/or management of infrastructure for public purpose for a specified period of time (concession period) on commercial terms and in which the private partner has been procured through a transparent and open procurement system". *As per the Pakistan policy on P3 (2010),* "Public-Private Partnerships (P3) involves the financing, development, operation, and maintenance of infrastructure by the private sector which would otherwise have been provided by the public sector. Instead of the public sector procuring a capital asset and providing a public service, the private sector creates the asset through a dedicated standalone business (usually designed, financed, built, maintained and operated by the private sector)

and then delivers a service to the public sector entity/consumer in return for payment that is linked to performance".

Public-private partnership (P3) projects are a relatively new phenomenon in Pakistan and are at the stage of infancy. The Government of Pakistan recognizes the importance of improving and expanding infrastructure services for sustaining economic and social development in its Medium Term Development Framework (MTDF). Substantial investment in infrastructure is required in Pakistan which the government foresees to be provided through public-private partnerships (P3). Attracting private sector investment has been a challenge for the government. The Government is implementing a combination of policy reforms, institutional support, incentives, and financing modalities to bolster private sector participation in financing, developing and managing future infrastructure development projects (IPDF, 2010).

2.3 P3 Projects in Europe

Over the last decade, there has been a tremendous rise of P3 projects across the world, almost all governments seem to be struggling to achieve economic development and sustainability by improving their basic infrastructural system. After the success of PFIs in the UK, P3 is rapidly gaining momentum in Europe and in 2005-06 the P3 market increased in size by 37% (Grimsey *et al.,* 2004). Construction Industry seems to be the major beneficiary of this concept as around 70% of P3 projects belong to construction engineering. In 2006 the tender value of P3 projects has more than doubled since May 2004 and is around €54 billion according to the fourth annual report (Sheskin 2007). Table 2.1 shows European countries with the leading implementation of P3 projects from 2001-08. UK is leading Europe for the implementation of P3 projects, where 536 P3 projects have been completed since 2001 with Germany at 2nd position with the completion of 40 P3 projects.

Table 2.1: P3 Projects in Europe *(Source: IFSL, 2009)*

S/No	Country	The capital value of projects (€ million)	No of signed deals
a.	UK	55131	536
b.	Spain	4127	38
c.	France	4093	34
d.	Italy	3563	20
e.	Republic of Ireland	3253	19
f.	Greece	2398	8
g.	Germany	2029	40
h.	Belgium	1780	6
i.	Netherlands	1733	9
j.	Poland	1520	2
k.	Austria	899	6
l.	Finland	700	1
m.	Bulgaria	654	6
n.	Hungary	556	11
o.	Cyprus	500	1
p.	Portugal	450	7
q.	Other countries	977	7

Roads are by far the most dominant sector, assisted by the fact that the concession model has a long and successful history within Europe, particularly in southern European countries. In recent times apart from the road, bridge, and tunnel infrastructure projects, there is an increasing

demand for hospitals, with a real health infrastructure market in Europe with projects in Italy, Spain, Portugal, France, Germany, Czech Republic and the UK as shown in Table 2.2. Rail also represents 15% by tender value of the market which consists mostly of light rail projects. The infrastructure for heavy rail has been delivered using a P3 model in only a few cases such as the Perpignan to Figueroa's cross-border rail link. The scale and politics of such projects make them difficult to deliver. However, there are several big schemes currently in development for high-speed links in Portugal, Austria and the Netherlands (Grimsey 2004).

Table 2.2: Sector Wise P3 Projects in Europe (IFSL, 2007)

Sector	%age
Bridges/Tunnels/Roads	60
Rail / light rail	22
Defence	4
Healthcare	4
Sports / tourism	3
Airports	2
Education	2
Waste/ Water	2
Prisons	1
Maritime /ports	1
Regeneration	1

2.4 P3 Projects in China

Development of P3 in China can be divided into three stages. From the mid-1980s to mid-1990s, the first successful P3 project *"Shenzhen Shajiao B Power Project"* was completed with the partnership of Hong Kong

Company. After the implementation of tax sharing reforms in China in 1994 between central and local governments, P3 witnessed the second wave of success and this time the major contribution was shared by local governments who were subjected to fiscal constraints due to 1994 tax reforms for the provision of infrastructural facilities to the public. The second wave of P3 projects was witnessed during the mid-1990s to 2000, where huge financial P3 projects were successfully completed in China mainly in the power and water sectors. Figure 2.4 shows the inflow of foreign direct investment (FDI) in China, India, and Pakistan. Where China is significantly leading the region since 2002 with remarkable achievements in the FDI. In 2010, China attracted US$ 185 Billion FDI in her country where India only had US$ 24.2 Billion FDI. Pakistan because of various reasons attracted only US$ 2 Billion FDI which is lowest in entire South Asia.

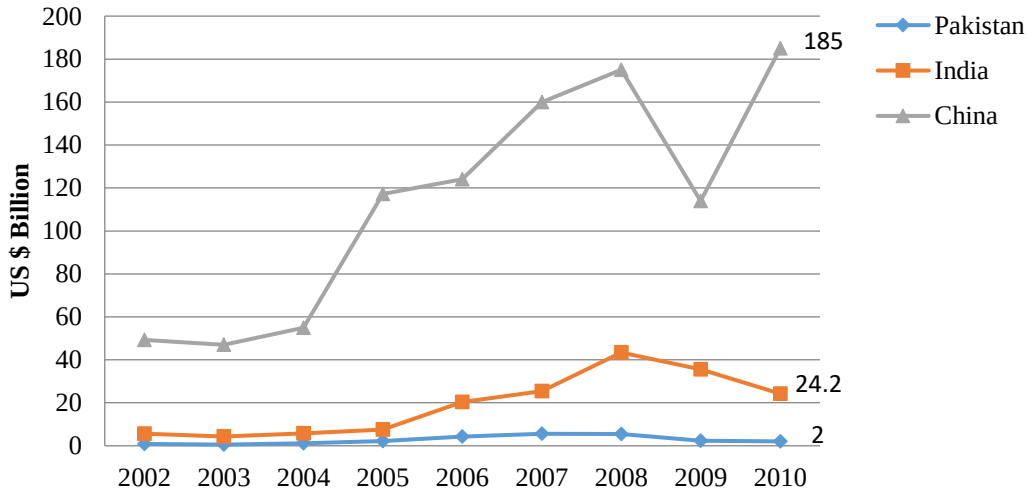

Figure 2.4: Comparison of Foreign Direct Investment (FDI) of China, India, and Pakistan *(World Bank, PPID, 2011)*

In 2001 and 2004, the central government of China revised P3 reforms, legislation and policies for successful implementation of P3 projects by eliminating corruption, illegality and disputes from P3 procurement model to large extent, this largely supported and encouraged private investors to undertake P3 projects in China without any financial loss fear as depicted in Figure 2.5, where China is leading the region with marginal FDI opportunities. Such favourable open-door policies and reforms generated another boom of P3 in China and during this time huge FDI was noticed in hundreds of P3 projects covering almost all sectors of the economy. As noticed from Figure 2.5, China is leading the region with completion of 968 P3 projects during the last two decades mainly in the development of energy and water & sewerage sectors, P3 in India is also gaining considerable momentum where 556 P3 projects have been completed since 1990 and major portion of these projects was undertaken between 2005 to 2010 and the country has also invested huge money in uplifting of telecom and transport sectors during recent years through P3 projects and presently leading China in this regard. Unfortunately, Pakistan is far behind in P3 investment comparison in the region with the completion of only 64 P3 projects so far and that too in the controversial energy sector; only 8 P3 projects in transport sector got completed during last two decades which is quite low in the region.

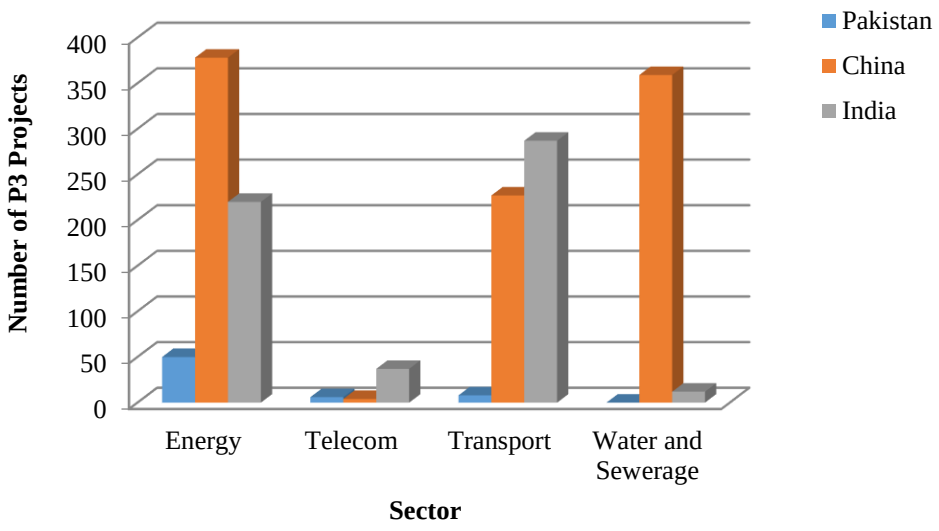

Figure 2.5: Comparison of P3 Projects of China, India and Pakistan. 1990-2011 *(World Bank, IPID, 2011)*

Some of the more successful P3 projects include Line 4 of Beijing Metro, the Beijing National Stadium (also referred to as the Bird's Nest), the Olympic Water Park project, the first sewage treatment plant of Shanghai Zhuyuan, the Hangzhou Bay Bridge, Line 4 of Shenzhen Metro, the sewage treatment projects in Canton Xilang, the ten water plants in Beijing etc. These cases have demonstrated that the P3 model is easier for financing in a shorter amount of time, reducing the financial burden on the local Government, investment diversification, and providing a reasonable amount of risk-sharing (Wang *et al.,* 2000).

2.5 P3 Projects in India

The Department of Economic Affairs (DEA), Ministry of Finance, Government of India is responsible for promoting P3 in India. Over the last decade, P3 projects in India have gained significant momentum for delivering strong economic growth across most sectors of infrastructural development.

Annual utilized FDI in India grew from US$ 636 million in 1991 to US$ 26 billion in 2009, making India in recent years the third largest destination of FDI in the world (Shen *et al.,* 2006). The major infrastructure development projects in the Indian state of Maharashtra (more than 50%) are based on the P3 model. Sector-wise, the road projects account for about 60% of the total projects in numbers, and 45% in terms of value (NHAI, 2011) Ports come in the second place and account for 10% of the total projects (30% of the total value). It is estimated that to bridge the infrastructure gap in India, over US$500 billion is required with at least US$150 billion needed from the private sector, over a 5 year period (2007-2012) (ADB, 2010). As in recent periods, private investment continued to concentrate in India and with a considerable decrease in 2011 due to the global economic recession, again investment in P3 projects in India is gaining momentum in 2012 as shown in Figure 2.6. Investment in P3 projects in India reached its peak during the year 2010, where a considerable amount of US$ 72.23 billion was spent on the uplift of infrastructural needs through P3 mode.

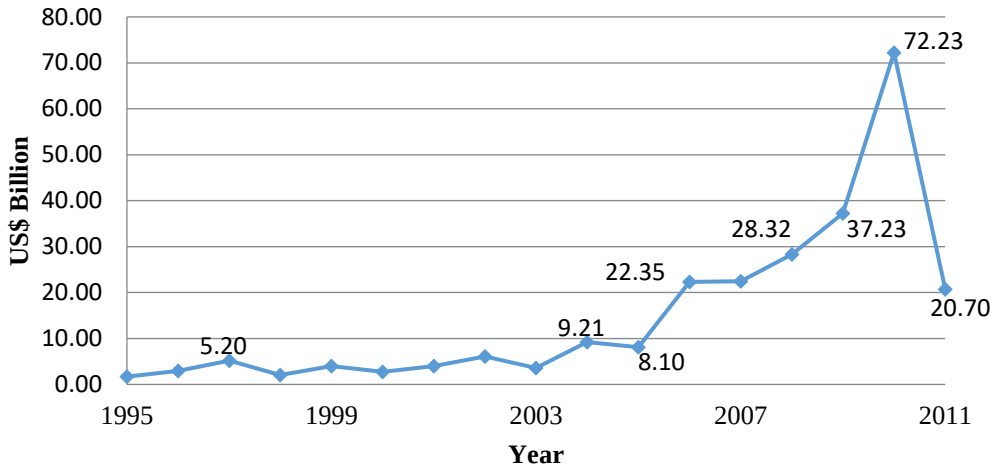

Figure 2.6: Indian Investment in P3 Projects, 1995- 2011

(World Bank, IPID, 2011)

Overall in P3 investment, India has attracted 70% of its portion in the transport sector only where road construction got 65% of the private investment. During the 2009-2011 period, India completed 23 major P3 road construction projects involving an investment of US$8.7 billion. Railroads attracted the second-highest investment level with US$6.1 billion invested in three large metro transit projects. Five port projects reached financial closure with investments of US$1.4 billion, and three airport projects attracted investments of US$360 million (World Bank, 2012). As shown in Figure 2.7, according to World Bank Report 2011, presently India is leading the region in the development of her infrastructural needs through P3.

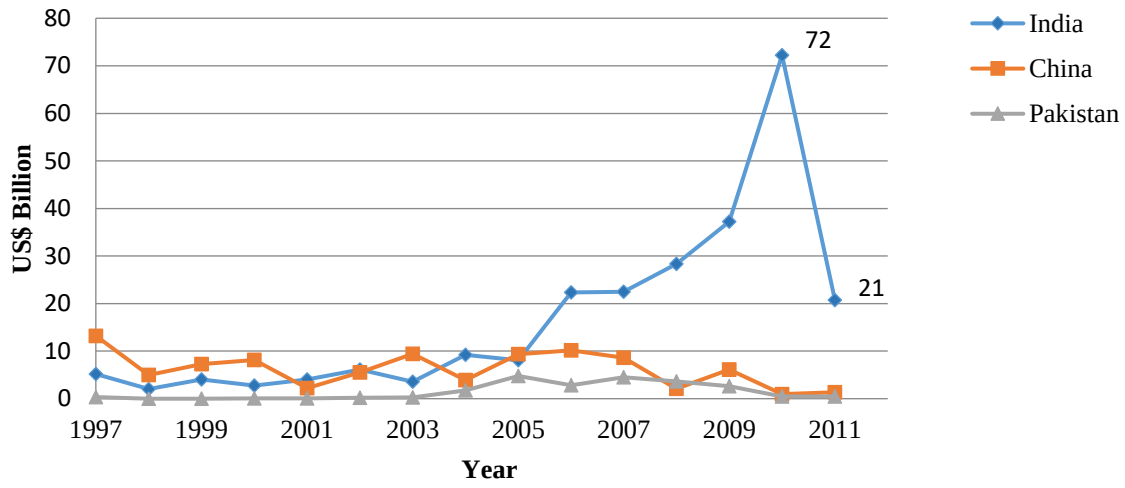

Figure 2.7: South Asian Comparison of investment in P3 projects

(World Bank, IPID, 2011)

Government of India, Ministry of Finance statistics says that investment in infrastructure would rise gradually from 4.7% of GDP in 2005/06 to 8 % by 2011/12. This translates to an investment of US$ 384 billion (2005/06 prices), assuming that the real GDP grows at 9 % per annum and annual inflation would remain at 5 %. As per World Bank report of 2011, India has significantly increased her P3 implementation program for the development of country infrastructural facilities since 2006 and reached on its peak in 2010 by completing 95 P3 projects in one year as shown in Figure 2.8.

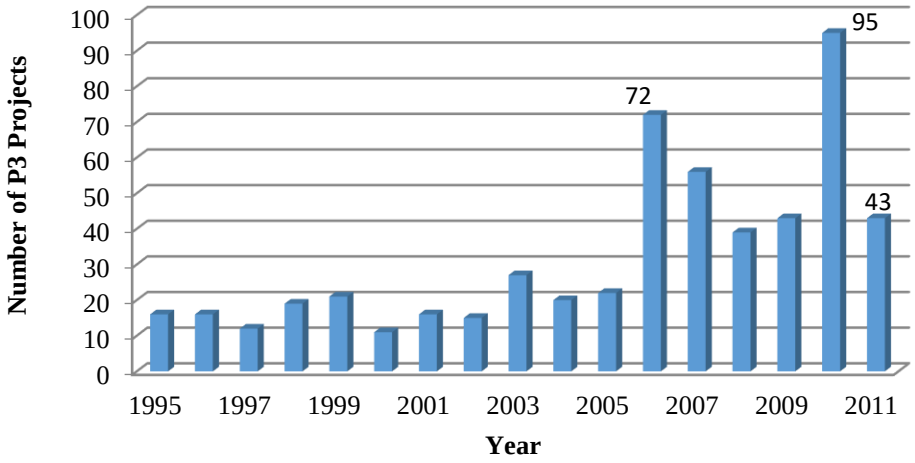

Figure 2.8: Number of P3 Projects in India, 1995- 2011

(World Bank IPID, 2011)

As per P3 India Data Base, Department of Economic Affairs, Ministry of Finance, there is a total of 1263 P3 projects in India till January 2011, out of which 212 P3 projects are being controlled by the central government and 1051 P3 projects are looked after by state governments. Some of the famous P3 projects completed during recent years in India are highlighted in Table 2.3:-

Table 2.3: Major P3 Projects in India, 2011

S/No	Project	State	Cost (US$ Million)	Type
1.	Modernization of Delhi International Airport	Delhi	1792/-	LDOT

2.	Prayagraj Power Project at Bara, Allahabad	Uttar Pradesh	2085/-	BOOT
3.	Sangam Power Project at Karchana, Allahabad	Uttar Pradesh	1375/-	BOOT
4.	Teesta -III hydro power project	Sikkim	1229/-	BOOT
5.	Vodarevu Nizampatnam Ports and Port based Corridor Development	Andhra Pradesh	3500/-	BOT
6.	Puducherry port	Puducherry	615/-	BOT
7.	Mumbai Trans Harbour Link Road	Maharashtra	833/-	BOT
8.	Hyderabad-Vijayawada Road Section	Andhra Pradesh	362/-	BOT
9.	Surat Dahisar Road Project	Gujarat - Maharashtra	520/-	BOT
10.	Panipat Jalandha Road Project	Haryana - Punjab	446/-	BOT

*(**Source**: P3 India database, Department of Economic Affairs, Ministry of Finance, Government of India)*

2.6 P3 in Pakistan

Pakistan demand for infrastructure needs is massive and its resources are not ample to meet with this demand. Not only is there limited fiscal space, but there are also huge gaps in public sector potential and capacity to build and operate infrastructure (IPDF, 2009). Pakistan requires approximately US$ 110 billion for the development of her infrastructural needs to ensure sustainable economic growth as per Medium Term Development Framework "MTDF" (2005- 2010), whereas country only spent US$ 18.5 billion on the infrastructure development through P3 during the said period (IPDF, 2009). Figure 2.9 shows the investment of Pakistan in the P3 projects since 1990, which is not that healthy if we compare it with China or India in our region and major investment shown in the figure also belonged to energy sector during 2005 and 2008 period, which is also criticized in the country for mismanagement in the contract awarding, procurement and implementation.

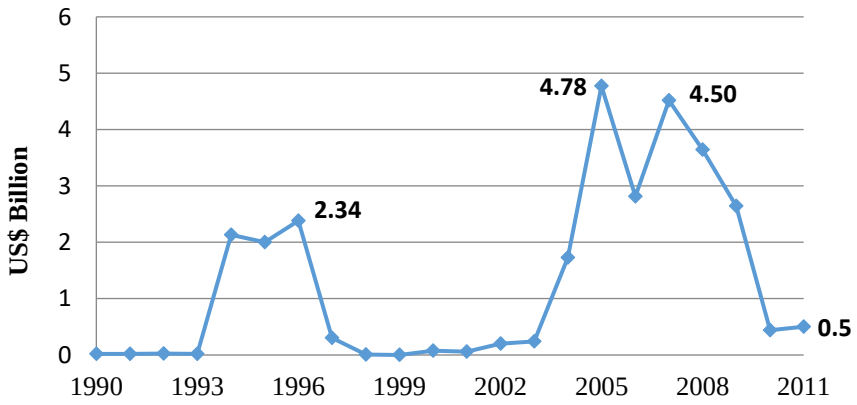

Figure 2.9: Pakistan Investment in P3 Projects

(World Bank, IPID, 2011)

The *Government of Pakistan* believes that less than half of the infrastructure investment needs can be met with public funds under the MTDF of the Government of Pakistan (IPDF, 2009). The country requires private

sector investment in infrastructural development at 5% of GDP per annum (the US $ 15 billion) to meet the national GDP growth of 7 - 8%. Therefore to meet with the future massive infrastructural development challenges, Government of Pakistan has to depend upon P3 procurement like other countries in the region through proper planning and management as shown in the figure to uplift her weak economic growth trends.

Development of P3 procurement in Pakistan can be broadly divided into two phases i.e. 1ST phase from the early 1990s to 2000 and 2nd phase from 2001 to the present year. During early 1990s, after considering the role of private sector investment in national infrastructural development projects, Pakistan initially established a policy and regulatory framework for P3 in the telecom and power sectors only in 1993 and created *"The Private Power and Infrastructure Board (PPIB)"* in 1994 as "One Window Facilitator" to promote private sector participation in the power sector of Pakistan (PPIB, 2011). During the 1st phase, the major P3 projects were the completion of 14 power projects of 3000 MW capacity by PPIB and construction of Pakistan's first motorway, the 367 km 6-lane connecting the cities of Islamabad and Lahore, constructed by South Korea's Daewoo Corporation, inaugurated in November 1997.

In 2000, Government took major initiatives in structuring proper framework for undertaking successful P3 projects in other sectors such as transport and logistics, water supply, sanitation, solid waste management, social sectors, and real estate. The Privatization Act 2000; the creation of a Ministry of Privatization and Investment; the setting up of the Board of Investment; the Insurance Act 2001 are some of the examples for the enhancement of P3 during that time.

In 2007, the Government of Pakistan established the Infrastructure Project Development Facility (IPDF) under the umbrella of the Ministry of Finance to provide expertise and hands-on support to Public

Institutions (Line Ministries, Provincial Governments, Local Bodies, and State-Owned Enterprises) on P3. IPDF's spectrum of projects ranges from transport and logistics, urban mass transit, municipal services, Social Infrastructure as well as small to medium scale energy projects. On January 2010, IPDF got approved "Pakistan Policy on P3" from the Economic Coordination Committee (ECC) of the Cabinet (IPDF, 2010). Pakistan till June 2011 has successfully handled 64 P3 projects in various sectors as shown in Figure 2.10 and has also experienced considerable boom of P3 constructional projects during period of 2006 – 2009, where construction of Gwadar Port, Sialkot Airport, Lahore-Sheikhupura-Faisalabad Dual Carriageway, Lakpass Tunnel Project near Quetta and Neelum Jhelum Hydal Power Project are some of the success stories of P3 in the country.

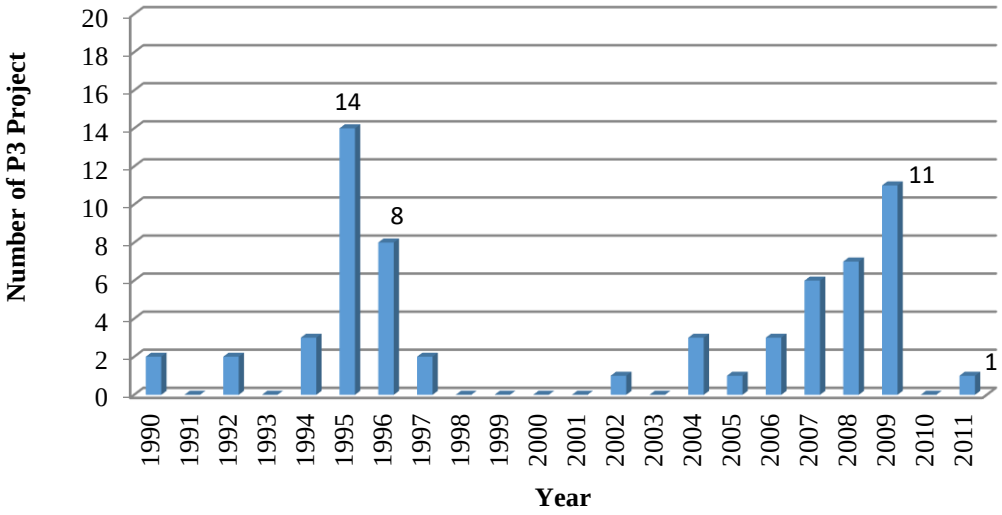

Figure 2.10: Pakistan P3 projects ***(World Bank, IPID, 2011)***

Out of 64 P3 projects which the government has undertaken so far, 50 P3 projects belonged to the energy sector alone making 78% of total projects. No project has yet initiated in the water and sewerage sector in the country as shown in Figure 2.11.

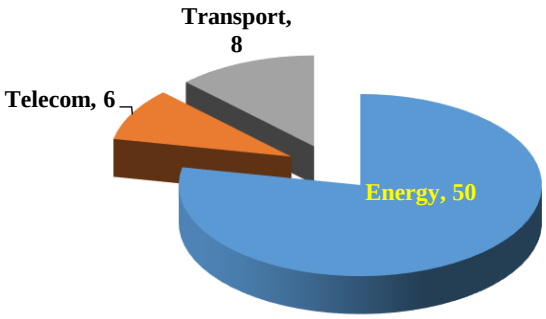

Figure 2.11: Sector Wise Distribution of Pakistan P3 Projects

(World Bank Report, IPID, 2011)

In Transport sector which consists on major constructional activities, Pakistan has successfully completed eight P3 projects till June 2011, out of which one is airport (Sialkot Airport), three are road and seven are seaport projects. Besides all these private investments, Pakistan is still far behind in the region in undertaking planned infrastructural projects especially in the transport sector and attracting private investment in the country, Figure 2.12 shows the comparison of transport sector P3 projects between China, India, and Pakistan. Where Pakistan is far behind in the region in the implementation of P3 infrastructural projects and especially in the development of roads infrastructure where India has undertaken 238 road construction projects through P3 mode and Pakistan has just three with her credit.

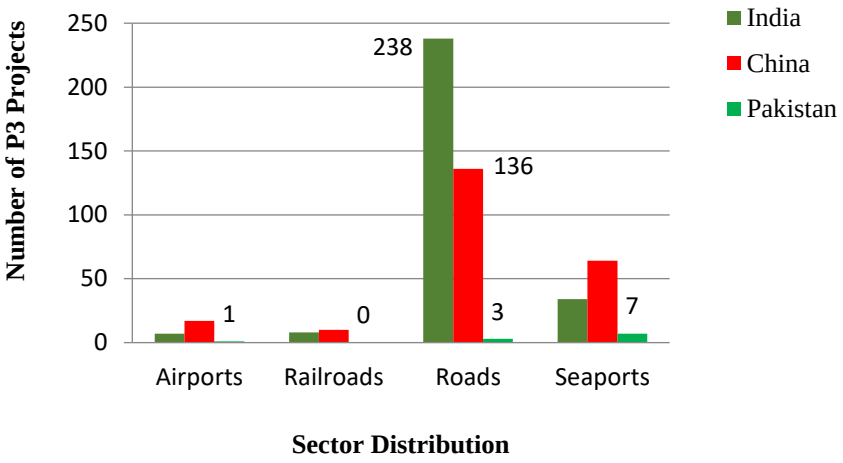

Figure 2.12: Comparison of P3 Transport Sector Projects of China, India, and Pakistan *(World Bank, IPID, 2011)*

With the assistance of the Asian Development Bank in 2007, the Government of Pakistan organized and structured a P3 program as shown in Figure 2.13, that included the followings *(IPDF, 2010)*:-

1. "Establishment of a P3 Task Force that is chaired by the Advisor to the Prime Minister on Finance and includes all key stakeholders. The purpose of the Task Force is to formulate a policy, regulatory and legislative structure that is conducive to creating a P3 market in Pakistan;

2. Establishment of the Infrastructure Project Development Facility that serves as the Secretariat to the Task Force, provides 'hands-on' technical assistance to implementing agencies at all tiers of government, builds their implementation capacity, and provides inputs financing, guarantees, subsidies etc.

3. Formulating a business plan to establish the Infrastructure Project Financing Facility (IPFF) to provide 'residual' long term fixed rate local currency financing.

IPDF is acting as a facilitator on behalf of local, provincial and federal governments for the Public-Private Partnering. IPDF's mandate is to help public sector agencies, at all tiers of the Government, to improve infrastructure development proposals and prepare for tendering to the private sector, without becoming a contract signatory to the transactions (IPDF 2011). Till to date, IPDF has handled various P3 projects worth of US$ 2.1 Billion, largest belonged to transport and logistics. After passing of eighteenth amendment of the Constitution of Pakistan on 8th April 2010, now provinces have become autonomous in dealing with P3 subject and sequel to it the Provincial Government in Punjab has taken several very impressive steps to increase private sector participation like forming up independent P3 cell in the planning department and formulation of comprehensive P3 policy. The Sindh Government has also taken considerable steps for the promotion of P3 in their area. Presently both provinces are handling a number of P3 projects like solid waste management, bus rapid transit system in Lahore city by Punjab government and construction of Hyderabad- Mirpurkhas Dual Carriageway Road by Sindh province. The structure of IPDF at federal level is as under:

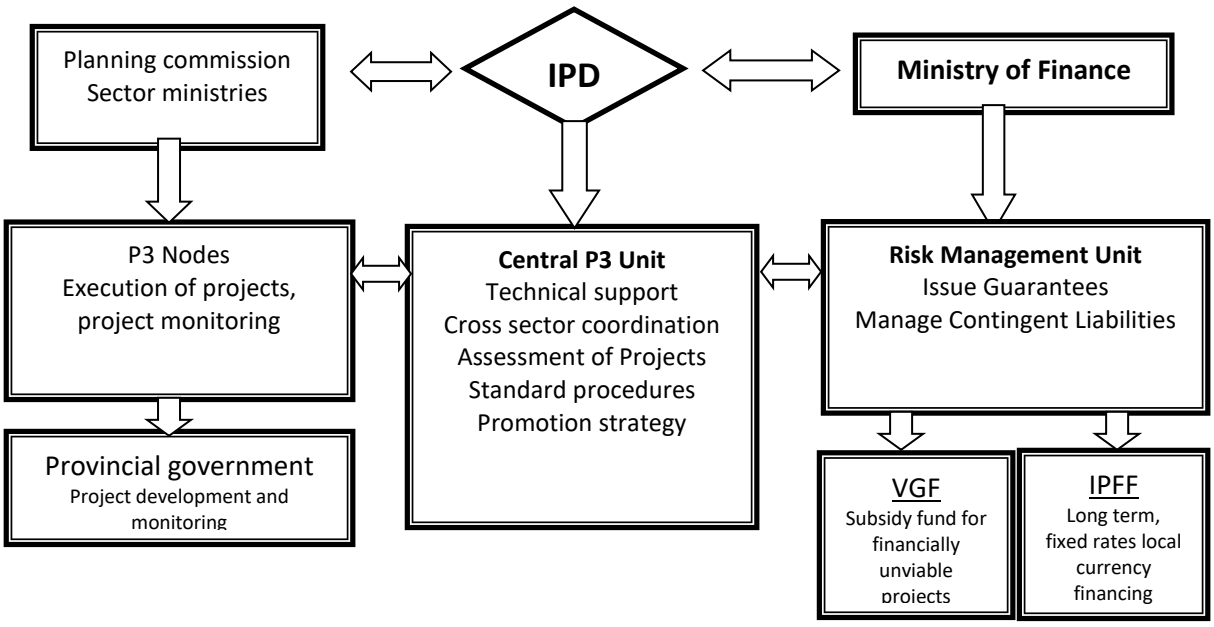

Figure 2.13: Official P3 Structure in Pakistan *(Source: www.ipdf.gov.pk)*

2.7 Types of P3

Over last decade, P3 across the world has been adopted in the number of forms or types by the governments and private sectors based on mainly the level of participation of private sector in the delivery of P3 project. The fast-growing popularity of P3 is generating more new concepts, forms and ideas around the world. Each P3 option implies varying levels of responsibility and risk to be assumed by the private operator, together with differences in structures and contract forms. The basic P3 contract types or forms are:-

a. Service Contracts.
b. Operational and Management Contracts.
c. Lease Contracts.
d. Concessions.
e. Build–Operate–Transfer (BOT) and similar arrangements.
f. Private divestiture.

2.7.1 Service Contracts. In the service contract, Public and private sectors develop a partnership with each other for the completion of specific tasks over short period of time normally ranging from few weeks to few years such as toll collection, installation, maintenance and reading of electric or water supply meters, waste collection and similar other technical systems etc.

The service provider receives a fee from the public sector to manage a particular aspect of public service (Jonathan 2009). Service contracts are more suited for the fulfilment of operational requirements where public sector benefits from private sector technological, managerial and cost savings techniques and expertise. During service contracts, the ownership of facility or system lies with public sector.

2.7.2 Operation and Management Contracts**.** The service provider is responsible for the overall management of all aspects of public service, but without the responsibility to finance the operation, maintenance, repair, or capital costs of the service. Management contracts are typically for three to five years. Management contracts generally specify the payment of a fixed fee plus a variable component - the latter being payable when the contractor meets or exceeds specified performance targets (Gupta *et al.,* 1998). Operation and management contract can be undertaken for the provision of certain facilities like at railway stations, airports, seaports or public parks, golf courses etc.

2.7.3 Lease/ Purchase. Public sector operating assets are leased to the contractor. The service provider is responsible for operating, repairing, and maintaining those assets. In some cases, the Service provider may be responsible for collecting tariffs and assume the related collection risk. The service provider pays the public sector rent for the facilities, which may include a component that varies with revenues. Generally, the service provider is not responsible for new capital investments or for replacement of the leased assets. Leases are usually for longer terms. Examples include the lease of a market, bridge or water system (Shen *et al.,* 2001). Responsibility for service provision is transferred from the public sector to the private sector and the financial

risk for operation and maintenance is borne entirely by the private sector operator (Grimsey *et al.,* 2002).

2.7.4 Concession. A concession makes the private sector operator (concessionaire) responsible for the full delivery of services in a specified area, including operation, maintenance, collection, management, and construction and rehabilitation of the system. Importantly, the operator is now responsible for all capital investment. Although the private sector operator is responsible for providing the assets, such assets are publicly owned even during the concession period. The public sector is responsible for establishing performance standards and ensuring that the concessionaire meets those (Grimsey *et al.,* 2002). The government still remains the owner of any existing facilities operated by the concessionaire, and of any new facilities constructed by the concessionaire. It is the responsibility of the government to ensure that the assets are properly used and maintained during the concession period and they are returned in good condition when the concession period is over (Broom *et al.,* 2002).

2.7.5 Build Operate and Transfer (BOT). BOT and similar arrangements are a kind of specialized concession in which a private firm or consortium finances and develops a new infrastructure project or a major component according to performance standards set by the government (Grimsey *et al.,* 2002). The service provider undertakes to design, build, manage, operate, maintain, and repair, at its own expense, a facility to be used for the delivery of public service. The government becomes the owner of the facility at the end of the contract period. There are many variations on the basic BOT structure including build–transfer–operate (BTO) where the transfer to the public owner takes place at the conclusion of construction rather than the end of the contract and build–

own–operate (BOO) where the developer constructs and operates the facility without transferring ownership to the public sector. Under a design-build-operate (DBO) contract, ownership is never in private hands. Instead, a single contract is let out for design, construction, and operation of the infrastructure project. With the design-build–finance–operate (DBFO) approach, the responsibilities for designing, building, financing, and operating are bundled together and transferred to private sector partners. DBFO arrangements vary greatly in terms of the degree of financial responsibility that is transferred to the private partner (Grimsey *et al.,* 2004).

2.7.6 Private Divestitures. Private divestiture involves the sale of assets or shares of a state-owned entity to the private sector. Divestitures are approached in many different ways, can be either partial or complete and may be used as a vehicle to transfer the ownership of assets from the government to private companies. Figure 2.14 shows the different types of P3 procurement model undertaken since 2001; BOT and Concession contracts are the leading procurement models which make 73% of total P3 contract types which show that different government around the world are more interested that private investors should finance and construct the P3 projects.

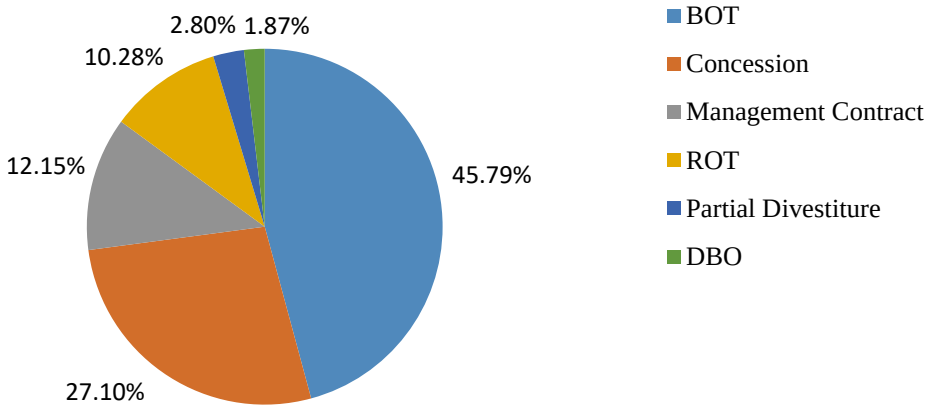

Figure 2.14: Comparison of P3 Models in Asia Leaving Service Contract (2001-2010) *Source: World Bank, IPID, 2010*

2.8 Assessment and Allocation of P3 Constructional Risks

Presence of effective, reliable and practical risk management system at any P3 constructional project not only helps in the planned execution of P3 project activities but also makes a favorable and conducive atmosphere for private investors to work on P3 with confidence. Justified and detailed assessment and allocation of P3 constructional project risk factors at feasibility study level marks success for any risk management system. But before understanding risk assessment and allocation on P3 constructional projects, first there is a need to clear minds on P3 constructional risks.

2.8.1 Definition of Risk

Broadly risk may be defined as *"the possibility of an outcome or return, which is different than expected usually below expectations"* (Risk Management Manual, Government of Punjab, 2010). According to HM Treasury (2001), "the uncertainty of outcome, within a range of potential exposures, arises from a combination of the impact and probability of events". On construction site, risk is the chance of an event occurrence on the project that would cause the actual project circumstances to differ from the initial planned and assumed when forecasting project benefits and costs. These events may bring positive or negative trends on the project for example floods, earthquakes and poor law and order situations may bring negative implications on the project and delay it than normal planned time frame, on other side using of modern management trends including use of software may complete the projects before its planned time frame (PMBOK, 2010 and RiskSIG, 2011). Risks on the project are mainly responsible for the non-achievement of planned objectives, therefore,

they are required to be handled within prescribe timeframe and that is early stage during the preparation of feasibility study when project has yet to commence. Through detailed analysis and evaluation of risks at planning stage, effective mitigation and lesser occurrence of disputes can be achieved during execution of constructional projects as risk management is considered to be core for any project profitability (Delmon, 2007). However, project risk management in Pakistan has a restricted focus. It mainly concerns the handling of losses due to its occurrence. In literature also most studies keep references to 'risks' in threat terms, with descriptions such as 'severity of impact', 'ease of detection' and the use of probability-impact matrices to determine whether a risk is low, moderate or high (Khasnabis et al., 2010).

For carrying out the risk assessment on the construction project during the initial planning phase, the first thing is finding out of significance value of an identified risks which will be achieved through the product of the probability or likelihood of occurrence of particular risk and its impact or consequences on the project when it does happen. Based on the results of significant value, various project risks will be prioritized for their proper assessment, pricing, mitigation, allocation and management during execution phase (Perry, 1986). Figure 2.15 shows a conceptual model of risk that has been developed by Thobani, 1999 by including uncertainty, probability, impact and outcomes.

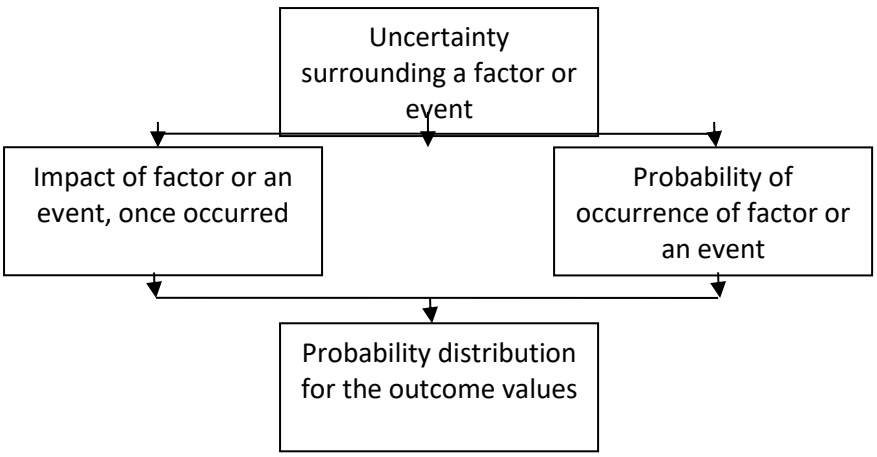

Figure 2.15: The Concept of Risk *(Thobani, 1999)*

2.8.2 Risk in P3 Constructional project

Risk is inherent and difficult to deal with and requires a proper management framework both theoretically and practically. This is more so for P3 implementation due to the large project scale, long concession period, complexity, and social sensitivity usually associated with P3 Projects (Grimsey and Lewis 2002). P3 projects encounter several risks that often lead to cancellations and/or significant renegotiations. The evidence from developing countries indicates that actual or perceived rise in tariffs, macroeconomic fluctuations in currency or purchasing power, inadequate regulatory and institutional environments, societal discontent against the private sector, and political reneging are some of the key reasons for the failure of P3 projects (Guasch 2004).

P3 procurement is quite different than normal constructional projects procurement in terms of involvement of multiple stakeholders sharing huge capital over long concession period with different interests of success in mind in the host country. Therefore risks related with P3 also increases due to partnership between unfamiliar government and foreign-based financers/ private sector builders who have unfamiliarity with the geography, the supply chain, the local customs, political behaviour and the business practices of the host country.

Over last few years, investment in P3 construction projects has considerably declined especially in developing countries due to involvement of more risks resulting into heavy investments and low

returns to investors (Gupta *et al.,* 1998). Much of the risks of P3 projects come from the complexity of arrangement itself in terms of documentation, financing, taxation, technical details, sub-agreements etc. involved in a major infrastructure venture, while the nature of the risks alter over the duration of the project, for example construction phase will have different risks than operational/maintenance phase. (Grimsey *et al.,* 2004). Pakistan, which is geographically, socially and ethnically diverse country, risks pertaining to P3 constructional projects will also vary because of following factors:-

a. **Type and scale of the project.** The severity and prioritization of risks will considerably vary due to different type and scale of P3 constructional projects in Pakistan. For example risks associated with the construction of mass rapid transit system in Karachi will vary from undertaking hospital or hotel constructional activity in same city. The risk of acquisition of land, rehabilitation of people and coordination with city government offices may be quite different in both cases.
b. **Location of the project.** In Pakistan risks related to P3 project will also vary because of the involvement of different project site locations. The private investor working in Baluchistan constructional project will have different risks than undertaking same project in Punjab province.
c. **Type of P3 implemented.** The type of P3 also affects the involvement and diversity of risks as the BOT project over long concession period will have different risks than O&M contract over a short duration.

2.9 Risk Assessment

Effective, practical and logical risk assessment contributes as a core in the risk management process. In simple form, risk assessment may be defined as identification of concerned risks and finding out of their significance on the project. Risk identification starts with listing down of all possible risks associated with any P3 constructional project based on thorough studies, experiences and project location and type. Then critical risks associated with particular P3 constructional project are selected keeping in view their effect and characteristics.

The field of risk assessment has assumed increased importance in P3 constructional projects for last few years by public and private sectors for the reliable and practical pricing, mitigation and handling of risks during execution and operational phase of the project. P3 Construction projects, because of their large and complex nature, are plagued by a variety of risks which must be considered and responded to in order to ensure project success (Okmen *et al.,* 2005). Different governments around the world are sincerely working for the effective management of P3 risks for the success of project and to build confidence in investors by setting up risk management units and protecting them through legal laws and regulations. For the successful risk assessment of P3 project, public and private sectors should jointly work on different techniques before signing of contract documents like surveys, investigative interviews, research, checklists and consultation etc. to identify the expected risks likely to be encounter during the execution of a project.

Previous studies on P3 also indicate that an objective, reliable, and practical risk assessment model is very essential for the success of P3 projects (Grant 1996; HM Treasury 2000; Li *et al.,* 2006). Systematic risk assessment allows early detection of risks and encourages the P3 stakeholders to identify, analyze, quantify, and respond to the risks, as

well as to take measures to introduce risk mitigation policies (Perry 1986; Akbiyikli and Brodie 1995).

Risk assessment estimates the chances of a specific set of risks occurring and/or their potential consequences. It is defined as "the systematic process to understand the nature of and to deduce the level of risk which provides the basis for risk evaluation and decisions about risk treatment" (Najja *et al.,* 2006). During this process, firstly all possible risks related to particular P3 constructional project will be identified considering the P3 contract type, location of project and behavior of stakeholders. Then the significance of selected risks will be measured through the product of their probability of occurrence and impact value for their analysis and evaluation through. All project holders are required to understand the importance and consequences of knowing the details of various risks which may occur during concessional period so that they can best manage them otherwise they will face irresolvable and hectic disputes at later stages.

Proper assessment of P3 risks will definitely help federal and provincial governments to understand the consequences of various risks during the project feasibility study and accordingly they can prepare themselves for the development of appropriate mitigation and allocation strategies before signing of P3 contract. As poor-risk assessed P3 projects will not only face financial losses and project failure but will also block future P3 initiatives in the country, which will be nightmare for the government infrastructural development program.

2.10 Risk Allocation

Risk allocation is defined as determining which party should bear the consequences of the occurrence of each event identified as a project risk. The efficient or optimal allocation of risk, that is the allocation of risks to the party that is able to manage the risk at the least cost, is clearly an

essential ingredient to the achievement of the best value for money outcomes (Owen *et al.,* 2006). Two principles are sometimes called upon in the literature to guide the risk allocation: 1) a risk factor should be allocated to the party that is responsible for it or has more control on it; and 2) a risk factor should be allocated to the party that is more able to bear the risk (less risk-averse) (Guasch, 2004). Risks for which neither party is responsible nor can be controlled better can be shared by both partners in P3 or such as risks can be allocated to insurers or other outside parties specializing in pooling the risk.

Simply risk allocation can be undertaken in a number of ways on P3 project i.e. transferring risks to private sector, retaining risks by governmental sector or both parties share particular risks. Justifiable risk allocation during initial/contractual period is very necessary to reduce the chances of dispute occurrence or unnecessary delays on the projects. Risk allocation is not that simple process in P3 because private sector will be looking for high-risk premiums to compensate for the risks while public or governmental sector will be more interested in getting value for money on the project and reducing of project cost. Some risks being allocated in accordance with requirements of the host country legal and regulatory structure for private infrastructure and other risks being allocated on the basis of project design and negotiation among the parties.

It is important for the public and private sectors to establish effective risk allocation strategies for P3 projects in order to achieve a more efficient process of contract negotiation and reduce the occurrence of a dispute during the concession period (Yongjian Ke, *et al.,* 2010). In the allocation of P3 risk factors, the main issues that need to be considered are the nature and size of the risk and the impact of each risk on each of the participants in the project (Zou *et al.,* 2006). It is important that key stakeholders, including consumers, are informed and consulted about the proposed risk allocation during the feasibility study preparation. Proper

and justified risk allocation will bring incentives for private sector to work for the provision of cost-effective and high-quality service delivery or they will be penalized through financial penalties for the compensations. Measures which government and other P3 participants can take for the better management of risk allocation include the following:- (Owen Hayford *et al.,* 2006).

a. **Don't lose sight of the basic principles.** Follow the basic principle of allocation of P3 risk after careful analysis and pricing of risks. Do not impose unmanageable and unrealistic risks in the private sector.
b. **Price the risk.** For better value for money assessment, government must price the risk before its allocation. Unrealistic priced risks may bring additional costs for the P3 project at later stages and this burden may be shared by taxpayers.
c. **More precise drafting of contract documents.** Risk allocation should be clearly defined in Contract documents without any ambiguity and confusion.

In Pakistan, there is general perception among private investors that government tends to shift major weight of risks pertaining to P3 construction projects to private sector to reduce their financial involvement at later stages but this concept brings high cost of construction projects as private investors always get compensation for bearing more risks. Government has to think risk-sharing with private sector in the contest of value for money on the project and burden on the taxpayer. The private sector will price the risk and will pass it to public sector in a form of bid. According to Lewis and Mody, 1997, the government needs to be able to assess its own risk exposures. In addition

the private sector should be able to model the risks and evaluate the company's ability to deal with these risks, using the two dimensions of severity and frequency to measure the risk impact. There is a tendency that the private sector will price the risk and pass this to the public sector in the form of a bid. If the cost of the risks is acceptable to the public sector, a contract will be easily awarded. If the private sector's charge is considered high, the public sector may need to go into a form of negotiation with the private sector and consider whether to accept the higher risk cost, or share the risks, or retain the risk in the public sector. Although risk allocation strategies in the real world may vary from project to project and from country to country, in general, risks that are related to the environment within which the project is implemented should be retained by the government, while the risks that are directly related to the project are mostly allocated to the private sector. Some risks that are beyond the control of both the public and private sectors should be shared by both parties (Young Hoon Kwak *et al.,* 2009).

In Pakistan, where P3 experience has not yet matured among government departments and still it is at basic level, there is requirement among government department that they should clearly understand the difference between risk mitigation and hidden cost which may be shared by them at later stages like during the late 1990s, where government gave unrealistic guarantees to private investors in energy sector for promoting risk mitigation and at later stage those decisions proved to be very costly for government and project. It is the duty of government departments to share their responsibility in the allocation of risks and be mindful of compensations linked with their non-compliance.

2.11 P3 Risk Types

The risks, a P3 project may be exposed to are affected by a number of factors, such as the type and scale of a project, the country where the

project is located, and the type of P3 implemented. Different P3 projects may, therefore, have different risk profiles. In addition, the importance of a particular risk factor may also differ from project to project and/or from country to country. For example, political risk is more important in developing countries than in developed markets. Different P3 risk factors can be looked at from the perspective of the different parties concerned: (i) the private party, (ii) the lenders, (iii) the Government, and (iv) the users of the services provided by the P3 project. Risks can also be grouped into categories according to their type: (i) commercial risks, which are related to the sector or business activity being contemplated (e.g., power generation or solid waste management); (ii) risks specific to a country, which include political, economic, and financial risks; and (iii) risks of a general nature such as force majeure. Risks can also be differentiated according to when they arise in the project cycle: (i) development phase risks, (ii) construction phase risks, and (iii) operation and transfer phase risks, therefore, P3 risks are both generic and project-specific (Risk Management Manual, Planning and Development Department, Government of Punjab, 2011). The type of risks associated with P3 project has many universally accepted definitions in literature.

Merna and Smith classified the risks of P3 projects into two broad categories: global and elemental. Risk factors in the first group are generally those outside the control of the project participants, including political, legal, commercial, and environmental factors. The latter group contains mostly the project-level risks, such as construction, design, operation, finance, and revenue risks. Li et al. proposed a three-level meta-classification approach to classify P3 project risks. The approach categorizes P3 risks into three levels: macro, meso, and micro. The macro-level risks are those risks external to the project itself; the meso-level risks are project-related risks; while the micro risks are party-related risks. According to Cristina Checherita, (2006) and Thobani (1999), nine

types of risks are present in any construction and infrastructure development projects and those are technical, operational, constructional, revenue, financial, force majeure, regulatory/political, environmental and project default risks.

Bing Li (1999) identified P3 risks according to two main groups: systematic risks and nonsystematic risks. Systematic risks refer to those that are caused by externally and cannot be controlled by the concessionaire. They include political risk, legal risk, financial risk and contingent risk. On the other side, nonsystematic risks are those risks which are related to the project construction and operation. These can include completion risk, operation risk and market risk. Li (2006) suggested that to implement P3 projects in China the risks of the project needs to be considered at different angles, including in terms of curiosity, long-term, complexity, multi-levels and multi-goals of stakeholders. They firmly believe that the severity of the risks would differ depending on whether it is a traditional or P3 project being considered. Another widely used approach in literature is to classify risks according to the project-specific areas they are related to, such as political, construction, operation and maintenance, legal, market, and financial risks.

It should be noted that risk factors identified in different literature are based on studies focusing on a particular type of P3 project (e.g., power plants or transportation) and/or in a particular area (e.g., the UK or China). There is no list of risks that is applicable to all P3 project and there is also no risk classification approach that is universally agreed to as best. On the basis of above-mentioned facts, a checklist of risk factors associated with P3 constructional projects in Pakistan as shown in "Appendix III" was compiled through in-depth literature review and carrying out number of personnel interviews with the professionals. Out of checklist, 42 risks have been identified as critical for Pakistan P3 construction projects, whose detail is as under:-

2.11.1 Political Risks.

There are many traditional political risks that private infrastructure investments are exposed to (Sheskin, 2007). Political risks make the perception of investors about the country's prospects. Political risks pertaining to P3 in Pakistan can be broadly divided into two main categories i.e. "risks due to government" and "risks due to instability". Risks due to the government may include the policies, transparency in governance, rule of law and presence of necessary legislation for the support and promotion of P3 projects in the country. Risks due to instability may be linked with the early elections, opposition stance on P3 projects and future political atmosphere of country towards local and foreign policies. For investors and public sector, political risks are required to be understood thoroughly at the initial phase before bidding to know their likely occurrence and impact on the project along with their necessary mitigation and structure which may be formed in the contract agreement. Political risks will influence projects directly and indirectly throughout their life starting from construction to operational and transfer phase. Based on literature review, following political risks have been listed as critical:-

a. **Government Incompetency.** Risk related with government weak reputation on handling law and order situation in the country, maintaining foreign relations, ensuring economic stability or reforms etc. will develop fears in the minds of investors and will also increase the cost of risk working specially in remote areas like Baluchistan and FATA etc. due to occurrence of likely losses which are related with working in such areas in the past.

b. **Political Instability.** Risk related with day to day occurrence of government's different scandals in local and international media, presence of strong opposition parties and frustration which is being developed in the people due to price hike and inflation is likely to affect the execution of P3 project. The Dabhol power plant project in India in the 1990s is a case in point. The election of a new government that was not supportive of the project led to renegotiation of tariff rates that reduced the profitability of the private firm (Sayegh, 2008).

c. **Corruption and Bribery in Governmental Offices.** The corrupt related behaviour of government officials will increase the cost of keeping relationships between the government and private investor. Meanwhile it will also increase the risk of breaking of contract agreement due to involvement of interests of various officials. The breakage of contract agreement of Reko-Diq gold mines in Baluchistan is an example of same risk factor.

d. **Poor Law and Order Situation**. The risk related to suicide bombing, killing of project personnel, material damage and cases of hostages.

e. **Strong bureaucratic influence.** Authoritarianism, absence of accountability, lengthy official procedures and political influence are some of the traits of strong bureaucratic behavior in Pakistan. On P3 project, this risk may delay project-related issues and increase the trustworthy gap between public and private partners.

2.11.2 Constructional / Management Risks.

Constructional risks in P3 projects vary from other projects which are being run under normal procurement procedures due to the involvement of private sector capital, more no of stakeholders involved and partnership of public sector. These risks are required to be managed at proper time in a well-coordinated way to achieve the objectives in terms of time, cost, quality and environmental sustainability. In Pakistan, constructional risks should be well understood and priced at the bidding phase by the public and private partners considering project location, quality standards requirement, time and cost schedules and occurrence of any dispute. In this regard, Government and private sector substantially lost financially and economically in 1997, when Turkish construction company Bayindar left their work on motorway M-1 due to mismanagement of constructional risks at early stages. Following major constructional/management risks pertaining to Pakistan environments have been identified from the literature:-

a. **Weak Government Administration System to Support P3.** This is a major concerned risk for private investors before undertaking constructional activities on project site. For the successful execution of P3 project, there is a requirement for the presence of legal, disciplined and effective government P3 based administrative system. This will be responsible for projects evaluation, planning, monitoring and feasibility studies. It will also establish Communication bridge between private investors and government offices for a better understanding of projects and their future implementations on a local and national level by integrating trust-building modalities.

b. **Failure to Perform as per Specification**. Risk is associated with the non-compliance of a construction partner with the laid down contractual obligations, standards and specifications.

c. **Constructional cost / time overrun**. The risk arises when there is a delay in the completion of the project within a stipulated time frame and thus increasing its cost and duration for the customer utilizing the facility within planned time frame. The consequences of the risk are availability of low cash during operational and maintenance period and increase in the interest rate on the loan due to time extension.

d. **Land Acquisition and Compensation.** The risk of facing difficulty in the acquiring of "the rights of the land" for the project execution within planned timeframe.The original timeframe for land acquisition may not be followed by the concerned party, which may increase project cost and time during later stages of its execution.

e. **Inexperienced / Incompetent Private Partner.** This risk is dependent on the finding out of inexperienced private partner during the construction process after the project has been initiated. Inexperience in handling P3 project management along with an assurance of required quality standards by private partner can lead to serious issues and problems pertaining to the execution of project during constructional and operational phase.

f. **Price Escalation of Constructional Material.** The U.K. based consultancy firm Merchant International Group published a report in early 1999 estimating that multinational companies lost about US$24 billion during 1998 in their foreign private infrastructure investment activities because of specific emerging market country risks (Broome 2002). This is the risk related with the increase in the cost of construction material on the project site due to its unavailability on the proposed query sites or in the market and closure of transport facilities due to law and order situation or any other geographical / weather-related factor.

g. **Poor Quality of Workmanship.** This is the risk of performing poor standards and procedures on the execution of constructional activities by skilled labour.

h. **Design Changes during Construction.** Insufficient engineering and design work in the preliminary stages of the project can induce risks in all subsequent phases, in terms of compatibility, performance, and demand risk (Cristina Checherita et al., 2006). Risks of changing design parameters during the construction phase will not only fluctuate the cost of the project but will also affect the scheduling and planning parameters of the project.

i. **Poor transportation facilities available.** Risk which is related to the location of project site at some remote areas where there are poor transformational facilities available for project execution.

j. **Design defects / deficiencies.** This risk can arise due to the responsibility on the party for the constructability, completeness and technicality of the design and also that party would be responsible for any deficiencies and defects related with the design during construction and operational period. Poorly designed structures will not only increase the operational and maintenance costs but will also increase project cost as a whole and duration of its completion.

2.11.3 Financial Risk.

These risks relate to the financial arrangements for project evaluation, design and construction, as well as for the phase of operation/implementation (Cristina Checherita et al.). Many important P3 projects at present are held up at federal and provincial levels like construction of Gwadar Port, Diamer-Bhasha dam and M-9 Motorway (Karachi-Hyderabad) etc. due to various financial constraints being faced by the foreign bankers and investors for the provision of loan over long period of time. Major financial risks which may affect Pakistan P3 constructional projects are:-

a. **Interest rate fluctuation**. In contrast, the interest rate will affect the project in terms of borrowing and debt payments. Any fluctuation in the interest rate will definitely affect the lenders. An appropriate interest rate should be agreed upon the project. The lenders have to pay extra cost if the interest rate is far high or benefit them if the interest rate is low. More foreign investors or private sector could be attracted by providing interest rate guarantee by the host

government (Solini et al., 2009). This risk is related with the increase in the interest rate on the loan/debt, which may be due to project cost or time overrun or due to involvement of variable interest rate on different category of loans. The risk may affect borrowing and debt payments. Interest on loan may get considerably increased as compared to revenue collection. Project capitalized construction costs and future debt requirements are dependent on the thorough and realistic interest rate assumptions. During uncertain economic conditions, this risk will be of more concern for the builders to have an eye on their loan spending and revenue generation options.

b. **Financing risk.** The risk associated with the failure in the fulfilment of timely provision of loans/payments by a partner or a bank for the planned execution of project activities as per schedule. This risk includes the fulfilment of the promises or financial guarantees made by government to the private investor during the contract period. Government has to be careful in initiating any guarantee to the private partner after its proper evaluation during initial phase otherwise it will lead to heavy hidden costs occur on the project and unnecessary delays and make the government reputation bad among private investors.

c. **The bankruptcy of a partner.** This risk is related to the nonpayment of debts by the construction company to the financer institutions/creditors as per planned timeframe.

d. **Poor economic conditions of the country.** Financial and economic risks also beset private infrastructure investors and projects. Foremost amongst these risks is the risk due to currency fluctuations (Sachs *et al.,* 2007). This risk is related with poor economic trends of host country like low foreign direct investment (FDI) index, declining GDP, rise in inflation, currency devaluation and non-seriousness of a government towards introducing any economic reforms.
e. **Government amendments pertaining to economic regulations.** Risk related to the implementation of new government financial laws and procedures pertaining to foreign private investment during the execution of P3 project, which was otherwise not included during contract phase.

2.11.4 Operational / Transfer Risks.

During the operation and transfer phase, professional and specialized individuals will be required to keep the project operationally sound. Otherwise poor operation and maintenance will severely affect the project revenues collection. Therefore it is necessary at the planning phase of the project that both public and private sectors should formulate a comprehensive plan for undertaking operation and transfer requirements of the project in a detailed way. Following risks will be associated during the operational/transfer period:-

a. **Less consumers avail the facility.** This risk is related with the less number of consumers who avail the facility due to construction of some other facility in the

neighbourhood or because of increased toll charges, poor law and order situation and fear of any financial damage.

b. **Operational / Maintenance cost overrun.** This risk is associated with the excessive operational and maintenance costs which may be borne by the private investor due to repair of constructional faults and equipment, accident prevention and maintenance of project productivity.
c. **Poor management abilities.** Risk related to the management of a project during operational phase in a non-professional and incompetent way leading towards the financial losses.
d. **The occurrence of constructional faults.** The risk associated with the occurrence of construction fault in the structure, closure of facility or low productivity during operational phase. This may lead to considerable financial loss.
e. **Lower revenue collection than anticipated.** This risk arises due to lower collection of revenue from taxpayers/customers in the form of toll or charges. It may occur due to management problems, design defects in facility, political opposition, low attraction to the project because of availability of some good related facility in the neighbourhood, lower demand of the built facility, high toll collection charges and some social or political factors. This risk severely affects the debt collection of private investors.
f. **Residual Value Risk**. This risk relates to the future market price of an asset (IMF 2006). It is specific to concession or

leasing contracts, in which the assets are returned to the government after (a long period of) private operation (Cristina Checherita et al., 2006).

2.11.5 Legal Risks.

Legal risks include changes in the general legal framework such as corporate laws, tax laws, environmental standards, and changes in the judicial system, especially regarding arbitration-related clauses (Cristina Checherita et al., 2006). This risk mainly depends upon the level of legal protection and framework available in the host country to protect the rights of invested money of the private sector on any P3 project. Behavior of host government along with country's judiciary system will make milestones to gauge the level of legal protection available in the country for undertaking any P3 project.

a. **Unfair tendering / bidding process (Favoritism).** Risk related to the unfair, non-transparent and biased tendering and bidding process by the public sector and ill legally supporting some other bidder based on favouritism.
b. **Failure in approval of the agreement.** This risk is regarding the financial loss of a private investor which he bears due to non-approval of agreement because of government formalities or political opposition.
c. **Unclear dispute resolution methods.** In the absence of a legal framework, P3 law and administrative setup, dispute resolution will remain ineffective on the project.
d. **Inefficient P3 supportive legislation.** Risk related to ambiguous or non-presence of P3 related legislation or law

in the government to protect the P3 procurement over long concession period between the partners. It is a weak structured legal and regulatory framework available in the host country to build the trust of private investors in undertaking P3 projects. This will also protect potential corruption and risk allocation procedures in P3 projects.

e. **Lengthy Court procedures.** This risk is related to the court system and procedures of host country that how quickly the disputes are being resolved in a justified way. Lengthy court procedures will bring unbearable financial loss on the project and may lead towards its failure.

f. **Change in government laws and regulations**. Risk related to the discriminatory changes of laws by the government after an awarding of P3 contract which may directly or indirectly affect the P3 project execution.

g. **The occurrence of dispute.** Risk related to the legal, contractual and official procedures on the project to handle occurrence of various disputes in an effective, sincere and coordinated way. A recent example in Pakistan is cancellation of contract of Turkish based construction company "Bayinder" working on Islamabad-Peshawar motorway project. The company was awarded contract in March 1993 with an amount of Rs 16,827 billion but it was cancelled in December 1993, when company had already spent Rs 800 million because of occurrence of various legal and contractual disputes between the partners.

h. **Complex governmental approval system.** The non-existence of P3 law, inexperienced P3 staff, lengthy approval systems, hectic official procedures and influential bureaucratic approach may lead towards complex governmental approval system for a P3 project

2.11.6 Relationship Risks.

Relationship risks of P3 constructional projects are associated with communication and coordination skills between various stakeholders. The timely solution of various constructional problems/issues arising on the P3 project not only facilitates the smooth functioning of project activities but also develops confidence between different partners in foreseeing severe losses through strong bonding of relationship between each other. Following are some of major risk factors belonging to relationship risk category which are selected for research study:

a. **Coordination among government departments.** During the complete life cycle of the P3 project, there is a requirement of coordinating various financial, legal, social and project-related activities with government departments for the timely completion and smooth operation of the P3 project.
b. **Lack of commitment from either partner**. This risk is related to the level of commitment being displayed by the partners during the execution of P3 project. Public, private sectors or financers lack support towards successful completion of P3 project may fail it completely because of trust deficit or involvement of complicated dispute resolution methods.

c. **Local people opposed to the project.** Unrealistic and poorly executed P3 project may find public opposition socially or politically. In the water supply and sanitation sector, the attempt to privatize the water system in Cochabamba, Bolivia led to large-scale riots and street protests within months of starting the project (Reijniers 1994).

d. **Relationship of federal and provincial governments.** This risk is regarding the relationship of federal and provincial governments in terms of legal, financial and political support for the P3 project.

2.11.7 Natural / Social Risks.

Timely assessment of natural/social risk factors on any P3 constructional project is of prime importance for both public and private sectors due to the involvement of huge hidden losses behind their common perception. Following are some of important risk factors related to this category:

a. **Force Majeure**. A risk which may occur due to certain unprecedented event/circumstances which are outside the control of government and private investor and may disrupt project execution. On physical side it may be floods, earthquake or storms etc. and on a political front, these may be in form of war, riot, strikes or radiation fallout from neighbouring country etc. Investors working in Pakistan will be more concerned about the effective handling of "force majeure" due to presence of geographical diversity and poor law and order situation in the country.

b. **Unforeseen weather conditions.** This is the risk which is related to unusual weather patterns, severe cold wave, heavy rainfall, dust storms, severe lightning or thunder conditions, and flooding.

c. **Environmental Issues.** The environmental risks are associated because of adverse environmental impacts, degradation and other environmental hazards (Uher *et al.,* 1999), for example the construction of dam, on one hand, leads to the generation of power for economic growth and productivity within the local/regional community but on another side, construction of dam can also lead to the inundation and destruction of fishing and farming ecosystems and the forcible relocation of people whose homes may be subjected to flooding.

d. **People rehabilitation issues.** This risk is related with the issue of rehabilitating project-affected people who undergo tremendous economic and psychological distress, which may prove to be serious hurdle during the implementation phase of the P3 project especially in the urban areas as the socioeconomic base of the local community is disturbed.

e. **Unpredicted geotechnical conditions.** According to World Bank report, changes in project scope during implementation can have a significant impact on the project cost and schedules. Such changes can arise, for example, from the inability of design-stage investigation to eliminate risks from unknown geological conditions for

construction of underground works or cutting of unpredictable hard rocks on project site.

2.12 Summary

In this chapter, the basic concept of the P3 model, its background and assessment and allocation of various risk factors associated with P3 constructional projects are discussed in detail. To understand the concept of risks linked with P3 procurement model, chapter discusses various countries P3 in detail for the understanding of P3 effects on the development of any country and links it with the association of various risk factors, whose timely assessment and allocation are very necessary for the successful implementation of P3 constructional projects.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This research study consists of combinations of methods and procedures based on thorough literature review and P3 constructional experiences in Pakistan. To reach on the logical conclusions, the research study can be broadly divided into seven stages. The first stage was going through comprehensive literature review comprising P3 related articles, papers and journals from renowned institutions and professionals to find out the assessment and allocation of risks in P3 constructional projects. In second stage, the critical risks were selected pertaining only to Pakistan P3 constructional projects environments. In third stage, a comprehensive questionnaire was developed to find out the risk assessment and allocation preferences of various P3 related respondents across the

country. In fourth stage, respondents across the country including all provinces and AJ&K were selected on merit to get them balanced, practical and on-ground risk perception ideas related with various P3 constructional projects. In fifth stage, questionnaires were distributed among all respondents along with carrying out of interviews of various P3 professionals including public, private and academics sectors. In sixth stage, survey data were collected from respondents and organized for its statistical analysis and scientific evaluation. In seventh stage, data analysis was carried out to reach on the logical and practical conclusions, recommendations and suggestions for future study.

3.2 Identification of Risks

The first step in risk assessment is the identification of critical risks related to P3 constructional projects in Pakistan including all provinces. Therefore to find out this answer, an extensive literature review was carried out from international and local related papers and journals followed by carrying out of fifteen personnel interviews during February 2017 with P3 professionals belonging to different departments and institutions from the country. Officials, contractors and professors from renowned institutions were also selected for interview like Ministry of finance, IPDF, Planning commission, Provincial government P3 cells/ ministry of finance, FWO, NHA, NLC, Deokjae Connecting Roads (Pvt.) Limited, NED UET and Peshawar and NED UET Karachi. Finally based on the literature study and experience/ knowledge of P3 professionals on construction projects, 42 risk factors grouped into eight major categories were identified for Research Work research survey.

3.3 Sample Size

Calculation of accurate sample size during research survey plays a very crucial and vital role in getting accurate and reliable data analysis, it also ensures that surveyed data is true representation of target population

keeping statistical power of data in mind. For this research study the sample size was calculated through following empirical formula (Jonathan Wilson, 2010):-

$$n = N / [(1+N (e) 2] \quad (3.1)$$

Where,

n = Sample size

N = Population size

e = Precision level

The research is regarding the assessment of risks associated with P3 constructional projects in Pakistan, therefore the population associated with P3 constructional projects across Pakistan was only selected from three major sectors i.e. public, private and academics to know the perception of various constructional engineering professionals of P3 in the country. According to IPDF, Planning division and ministries of finances of provinces; there were twenty major P3 constructional projects in the country, which had been either completed or under progress till December 2016. Out of twenty, fifteen P3 constructional projects were shortlisted from all over the country as shown in Table 3.3 given at the end of this chapter. Total of 250 professionals (population) associated with fifteen P3 constructional projects from all over the country was identified for carrying out Research Work research survey in January 2017. The precision level of ±5% was selected, where 95% of the sample values are within 2 standard deviations of the "n" comes to be 139, which will be true representation of population of 250.

3.4 Sample Composition

Total 250 respondents in three categories i.e. public, private and academics were selected across the country on January 2017 after careful analysis of P3 constructional projects in Pakistan by keeping two main

criteria in mind. One; respondent should have at least more than 5 years of civil engineering experience as per PEC record and second; he/she must have worked on any P3 constructional project in Pakistan or possess sound knowledge of P3 constructional projects. As far as the respondent experience was concerned, 73 respondents (48%) had P3 constructional experience which was healthy sampling number for carrying out desired empirical survey; 78 were found without P3 experience but they had constructional engineering experience as per PEC record as shown in the following Table 3.1:-

Table 3.1: Detail of Respondents Experience.

Location	**P3 Experience**						**Field Constructional Experience**						**Total**
	Public		Private		Academics		Public		Private		Academics		
	≤ 5 yrs	> 5 yrs	≤ 5 yrs	> 5 yrs	≤ 5 yrs	> 5 yrs	≤ 5 yrs	> 5 yrs	≤ 5 yrs	> 5 yrs	≤ 5 yrs	> 5 yrs	
Federal	03	05	03	02	01	04	-	-	02	-	-	01	21
Punjab	04	03	02	04	-	05	02	02	-	04	01	02	29
Sindh	02	02	01	02	01	03	01	04	02	03	-	03	24
KPK	03	01	02	-	01	02	02	04	01	04	01	03	24
Baluchistan	01	01	01	01	-	02	01	04	02	03	01	03	20
Gilgit-Baltistan	01	-	01	03	-	01	02	03	-	01	-	04	17
AJ&K	02	-	02	-	-	01	01	03	01	02	01	03	16
Total	**16**	**12**	**12**	**12**	**03**	**18**	**09**	**20**	**08**	**17**	**04**	**19**	**151**
	73						**78**						

3.5 Design of Questionnaire

After identification of 42 risk factors associated with P3 constructional projects of Pakistan, a detailed questionnaire was prepared for conducting empirical research survey and finding out the perception of public, private and academics P3 professionals towards the assessment and allocation of risks associated with Pakistan P3 constructional projects in all provinces and AJK. The research questionnaire was divided into

three parts, part one was regarding the gathering of personnel information of the respondent and to gauge his/her P3 experience and background constructional engineering knowledge, part two made the major portion of the questionnaire, where 42 risks were divided into seven major categories i.e. political, constructional/ management, financial, legal, operational, natural/social and relationship. Each category had its own risks which were required to be assessed and allocated through three tables. One was regarding give the probability of occurrence of a risk denoted as (a); another was to know the impact value of that risk if it occurs denoted as (b) and last one was to find out the allocation perception of risk among public and private sectors.

3.6 Risk Rating

A five-point Likert scale was used for the measurement of data. A Likert scale is a type of psychometric response scale often used in questionnaires and is the most widely used scale in survey research. When responding to a Likert questionnaire item, respondents specify their level of agreement to a statement (A.Deviprashad, 2007). To analyze the probability of occurrence of risk, the five-point Likert scale represents 1 = Very Small, 2 = Small, 3 = Normal, 4 = Large, 5 = Very Large and to measure the impact value of risk if it occurs, five-point Likert scale denotes 1 = Very Low, 2 = Low, 3 = Medium, 4 = High, 5= Very High. Regarding the risk allocation, three options were given to the respondent to allocate the risks i.e. Public sector, Private Sector or sharing of risk among both parties.

3.7 Pilot Study

Before distribution of a questionnaire among respondents or a detailed study, a pilot study was carried out in February 2017 to check the workability, practicality and realism of proposed questionnaire form and to also find out the resources required for the research study. It was also

aimed to check the effectiveness of sampling frame and the level of success which was desired to be achieved through proposed techniques. Six detailed interviews were carried out from renowned P3 professionals in the country belonging to public, private and academic sectors. The government officials from Ministry of Finance, IPDF, PPIB and NHA were interviewed to discuss the proposed research procedures and data analysis techniques. In private sector, FWO, NLC, LAFCO (Pvt) Limited and DESON Engineering Limited were consulted to check the validity and reliability of a questionnaire form including its arrangement, language and time required to answer the questions. In academic sectors, renowned professors already busy on P3 research from NED, UET and Peshawar were interviewed to find out any weaknesses in research plan or in data analysis techniques.

3.8 Data Collection

The main part of the research study was the collection of required data, which was obtained through filling of questionnaire forms and carrying out of personnel interviews from targeted population. Out of 250 respondents, 85 belonged to public sector, 94 were from private sector and remaining 71 respondents were associated with renowned engineering universities across the country as shown in Table 3.2. As far as the distribution of respondents from all over the country is concerned, 53 respondents belonged to Punjab province where major P3 constructional projects were executed, 45 were from Sindh province, 37 respondents were selected from federal and KPK, 26 respondents each belonged to Baluchistan, Gilgit Baltistan and AJK. Out of 250 identified respondents, twenty P3 professionals were interviewed across the country including Islamabad, Rawalpindi, Lahore, Peshawar, Karachi and Quetta to get the required data and their experience towards risk assessment and allocation. These cities were selected based on the

undertaking of some of very important P3 constructional projects during last decade. Out of remaining 230 questionnaire forms, 136 were received in April and May 2017 from the respondents as per the detail is given in the following Table 3.2:-

Table 3.2: Detail of Respondents Feed Back.

Location	**Public**		**Private**		**Academics**		**Total Sent**	**Total Received**
	Sent	Received	Sent	Received	Sent	Received		
Federal	12	08	15	07	10	09	**37**	**24**
Punjab	18	11	20	10	15	08	**53**	**29**
Sindh	15	09	18	08	12	09	**45**	**26**
KPK	12	10	15	07	10	07	**37**	**24**
Baluchistan	10	07	10	07	06	06	**26**	**20**
Gilgit-Baltistan	08	06	08	05	10	06	**26**	**17**
AJ&K	10	06	08	05	08	05	**26**	**16**
Total	**85**	**57**	**94**	**49**	**71**	**51**	**250**	**156/250**
	67%		**52%**		**71%**			**60%**

Out of 156 received survey questionnaires, five were rejected due to various ambiguities and overwriting errors, 151 valid responses were finalized for the final data analysis. The final distribution of 151 questionnaires received across the country is as shown in Figure 3.1, where uniformity among respondents category can be seen in all provinces. Major feedback of respondents belonged to Punjab province followed by Sindh and KP provinces.

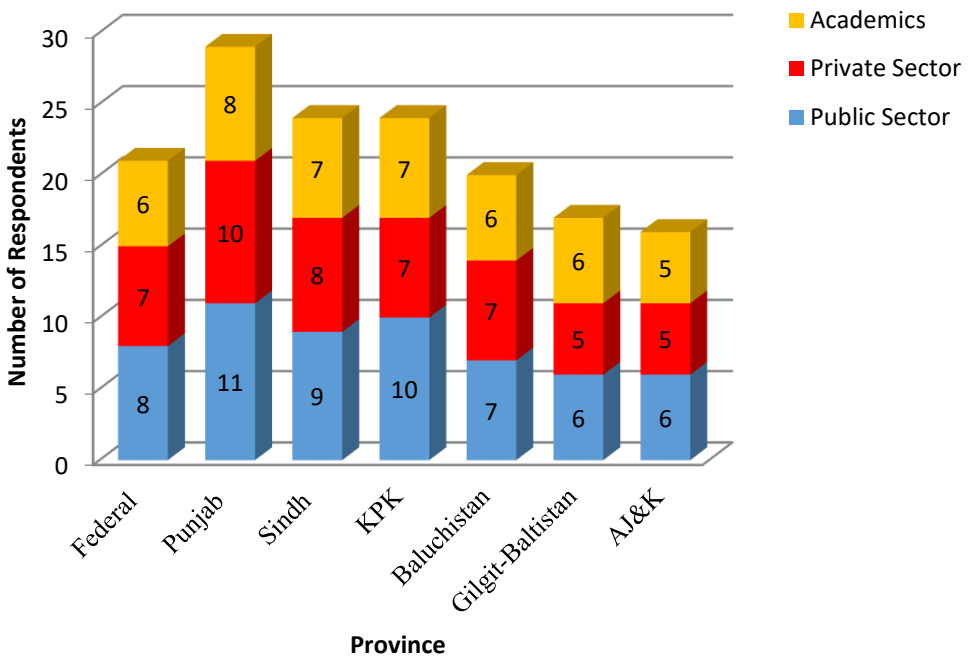

Figure 3.1: Distribution of Received Questionnaires.

The major category of respondents belonged to 15 P3 constructional projects of the country as shown in Table 3.3. The major criteria while selecting the projects were their uniform distribution in various provinces. Two live P3 projects were selected from federal area where respondents were already busy in their execution. In Punjab province, no major in progress P3 project was found to be included in the survey so three famous completed P3 projects were chosen for the research study. Similarly in other provinces also the effort was made to survey those individuals who are familiar with P3 constructional projects in Pakistan as shown in Table 3.3.

Table 3.3: P3 Projects Selected for Research Survey

S/No	Project	Category	Province
i.	Construction of Islamabad New Airport Project	Airport	Federal
ii.	Development of E-11 Sector (Northern Strip), Islamabad	Real estate	Federal
iii.	Construction of Islamabad-Lahore Motorway (M-2)	Road	Punjab
iv.	Construction of Lahore-Sheikhupura-Faisalabad Dual Carriageway	Road	Punjab
v.	Construction of Sialkot Airport	Airport	Punjab
vi.	Thar Coal Project, Sindh	Mining	Sindh
vii.	Construction of Hyderabad- Mirpurkhas Dual Carriageway, Sindh	Road	Sindh
viii.	Construction of Container Handling Terminal, Port Qasim Authority, Karachi	Port	Sindh
ix.	Construction of Gawadar Port Project	Port	Baluchistan
x.	Construction of Lakpass Tunnel, Quetta	Road	Baluchistan
xi.	Lower Palas Valley Hydro Power Project, KPK	Energy	KPK
xii.	Solid Waste Management System, Charsadda.	Sewerage	KPK
xiii.	Mahl Hydro Power Project, AJK	Energy	AJK
xiv.	Neelum- Jhelum Hydal Power Project	Energy	AJK
xv.	Diamer-Basha Dam Project	Energy	Gilgit-Baltistan

3.9 Data Analysis Strategy

To get the reliable and practical outcomes out of received data from respondents across the country, the data analysis strategy is divided into following steps:

a. Distribution of received questionnaires into respective provinces and respondent category i.e. public, private and academics.

b. Acceptance/ rejection of questionnaire forms for final data analysis.

c. Entering of complete data into SPSS Program for its analysis.

d. Checking the normality, reliability and correlation of complete data.

e. Carrying out of parametric/non-parametric tests.

f. Assessment/Ranking of risk factors based on risk significance values.

g. Finding the relationship between provinces and groups of respondents in ranking of 42 P3 constructional risk factors.

h. Determination of risk allocation preferences between various groups of respondents.

i. Identification of themes and concepts in the data.

j. Carry out diagramming to understand complex relationships.

k. Writing of data reflective notes for conclusions and future recommendations.

3.10 Summary

Chapter three discusses the detail of formulation of survey questionnaire form and identification of 42 P3 constructional risk factors associated with Pakistan working environments. The chapter also briefs in detail regarding the sample size and data collection procedures for data analysis. Finally the chapter tells about the adoption of various steps towards the data analysis strategy.

CHAPTER 4

RESULT ANALYSIS AND DISCUSSIONS

4.1 Introduction

To check the quality, normality, reliability and authenticity of questionnaire surveyed data which was received from various categories of respondents across the country pertaining to assessment and allocation of P3 constructional risks, the following basic data analysis tests were performed on the received data:-

4.2 Measurement of Normality of Data

The type of data used for the research study was on an ordinal scale and more precisely it was based on the Likert scale measurement involving various categories of respondents across the country, therefore, the surveyed data showed no normal distribution like parametric data behavior so it was treated as *non-parametric* for its further analysis and statistics study.

4.3 Measurement of Reliability of Data (Non-Parametric)

To estimate the internal consistency of scale data given by respondents as per Likert scale, Cronbach's Alpha (α) was used to measure its reliability or viability or correlation before its interpretation. The value of "α" ranges from negative infinity to one, where a score closer to one would indicate a higher degree of reliability (Cronbach, 1951). By using SPSS, the value of Cronbach Alpha was calculated as 0.808, which means that there was 80.8% of the variability in the composite score by combining 42 risk factors submitted for the data analysis, it can also be

interpreted that there was high level of uniformity or strong internal consistency reliability between the scores submitted by respondents in ranking of various risk factors.

4.4 Measurement of Level of Agreement Among various Groups

This procedure is useful for studies in which three or more groups create rankings of items. The resulting statistic represents the level of agreement among the various groups in ranking the items. Kendall Coefficient of Concordance (W) extends the Spearman Correlation Coefficient to more than two groups. The values of the W extend between -1 to +1. Negative values indicate negative association among groups, zero value indicates no correlation between groups whereas positive value and close to one indicates stronger correlation between the groups in ranking of the items. To measure the level of agreement between risk probability, impact and significant values in the ranking of 42 risk factors associated with P3 constructional projects of Pakistan, values of Kendall Coefficient of Concordance were calculated by using the Statistical Package for the Social Sciences (SPSS). The values of "W" were 0.839, 0.940 and 0.902 as shown in Table 4.1, which shows that there is strong correlation between risk probability, impact and significant values.

Table 4.1: Kendall Correlation (W) Between Risk Probability, Impact and Significance Values.

Description		Risk_ Prob	Risk_ Impact	Risk_ Significance
Risk Probability	Correlation Coefficient	1.000	.839**	.940**
	Sig. (2-tailed)	.	.000	.000
	N	42	42	42
Risk Impact	Correlation Coefficient	.839**	1.000	.902**
	Sig. (2-tailed)	.000	.	.000
	N	42	42	42
Risk Significance	Correlation Coefficient	.940**	.902**	1.000
	Sig. (2-tailed)	.000	.000	.
	N	42	42	42

**. Correlation is significant at the 0.01 level (2-tailed).

4.5 Comparison of Risk Rankings among Various Provinces / Parts

The mean rating for 42 P3 constructional risks in Pakistan was calculated on the basis of risk significance value (Shen *et al,* 2001).

Where risk significance for each risk factor was calculated through the following formula:-

Risk Significance = Risk Probability x Risk Impact (4.1)

The mean score ranking technique was used to obtain the values of risk probability and impact, which is also a common technique used to analyze the results obtained by questionnaire surveys (Chan et al., 2009). The mean score for each risk factor was calculated separately for risk probability and risk impact factor through the summation of scores given by the respondents according to the Likert scale divided by the number of respondents. The formula used was:-

$$Ms = \Sigma s / n \quad (4.2)$$

Where Ms = Mean score of each risk

s = Score given by respondent as per Likert Scale

n = Number of respondents

Table 4.2 shows the "Top 15 Risk Factors" associated with P3 constructional projects in Pakistan based on the mean values of risk significance given by the respondents from various parts/provinces. Table shows that "*Political Instability Risk"* has been viewed as overall "No 1 Risk" by the respondents from all over the country belonging to public, private and academic sectors with the mean value of 17.43, which is quite high; different provinces ranked and viewed political instability risk with varying degrees, for example Sindh province has ranked it at the 4th position whereas respondents from KPK province considered it at the 1st position but overall

Table 4.2: "Top 15 P3 Constructional Risk Factors" in Pakistan.

Risk Description	Federal	Punjab	Sindh	KPK	Bal	GB	AJK	Total	Rank
Political instability	17.64	17.64	17.22	17.72	17.06	17.47	17.26	17.43	**1**
Corruption and bribery in government offices	17.47	17.14	17.1	17.47	17.26	17.39	17.06	17.27	**2**
Strong bureaucratic influence	15.68	17.39	17.77	17.1	16.6	17.68	17.64	17.12	**3**
Poor law and order situation	16.32	16.85	17.51	17.39	17.85	16.2	16.48	16.94	**4**
Complex governmental approval system	17.02	17.06	17.31	16.89	15.83	17.1	16.93	16.88	**5**
Poor economic conditions of country	16.85	16.77	16.04	15.92	16	15.96	14.77	16.04	**6**

Weak government administration system to support P3	13.77	15.01	16	16.76	17.02	16.69	16.77	16.00	**7**
Insufficient P3 supportive legislation	15.67	14.59	15.88	16.24	16.4	16.47	16.4	15.95	**8**
Government incompetency	14.47	14.61	16.73	16.4	16.65	16	15.76	15.80	**9**
Unfair tendering / bidding process (Favoritism)	15.29	14.08	16.89	15.44	16.65	15.31	14.8	15.49	**10**
Force majeure	16.12	16.04	15.05	15.29	14.97	14.85	15.8	15.45	**11**
Acquisition of land	14.37	16.28	17.01	16.12	11.94	14.54	15.09	15.05	**12**
Occurrence of dispute	15.92	14.05	14.56	16.24	15.87	14.63	12.84	14.87	**13**
Financing risk	14.67	16.48	14.89	15.05	13.5	15.01	13.34	14.71	**14**
Lengthy court procedures	14.18	15.37	15.05	14.72	15.02	13.99	13.16	14.50	**15**

political instability in the country has been viewed as the topmost important risk related to the successful execution of P3 constructional projects in Pakistan. Risk of corruption and bribery in the government offices has been ranked at the 2nd position with the mean risk significance value of 17.22 and risk due to strong bureaucratic influence is placed at 3rd position and similarly respondents considered complex government approval system and poor law and order situation in the country at 4th and 5th position respectively. Overall respondents across the country seem to be more concerned with political risks as they placed all political risks, three legal risks and one financial and management each risk in top ten categories. In top five risk factors, first four belonged to political category whereas only one was from the legal category.

It can also be judged through respondent's feedback that all political risk factors were within the top fifteen. This shows the concern of all respondents from various provinces towards the country's weak political atmosphere at present for the successful execution of P3 constructional projects. From observing the risk significance values of top ten risk factors as shown in Figure 4.1, it is also clear that respondents also considered significance of first five P3 constructional risks as a group more than any other risk factors.

If we consider various parts of the country independently we find that in Baluchistan province, government complex approval system is highest ranked risk followed by strong bureaucratic influence as shown in Figure 4.2, whereas for respondents from federal area Islamabad, Strong bureaucratic influence is top priority risk followed by poor law and order situation in the country.

Political instability has been considered as number one risk by federal, Punjab and KPK provinces, whereas Sindh and Gilgit Baltistan provinces along with AJK considered strong bureaucratic influence as top priority risk associated with P3 constructional projects in their areas.

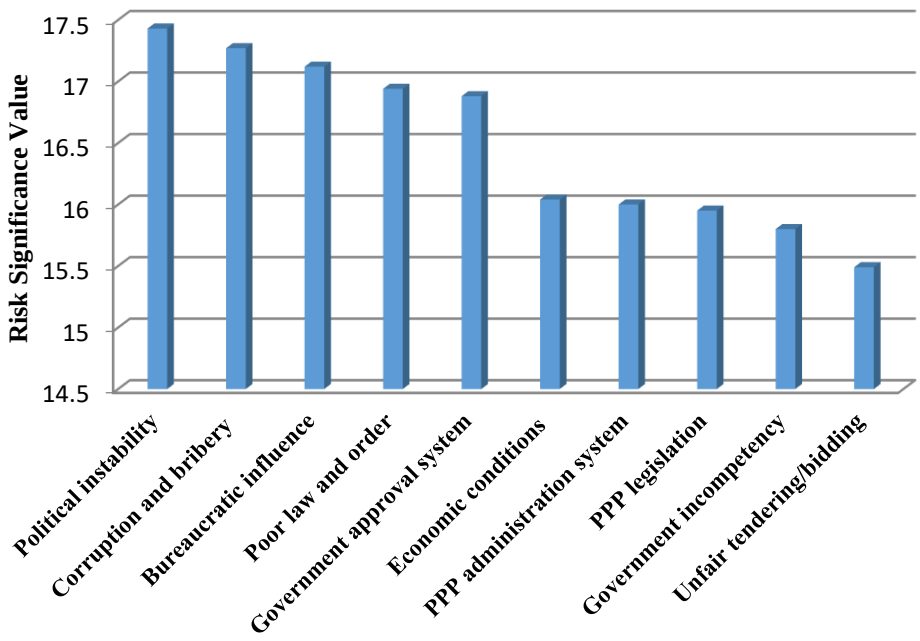

Figure 4.1: "Top Ten P3 Constructional Risk Factors in Pakistan" based on Risk Significance Value

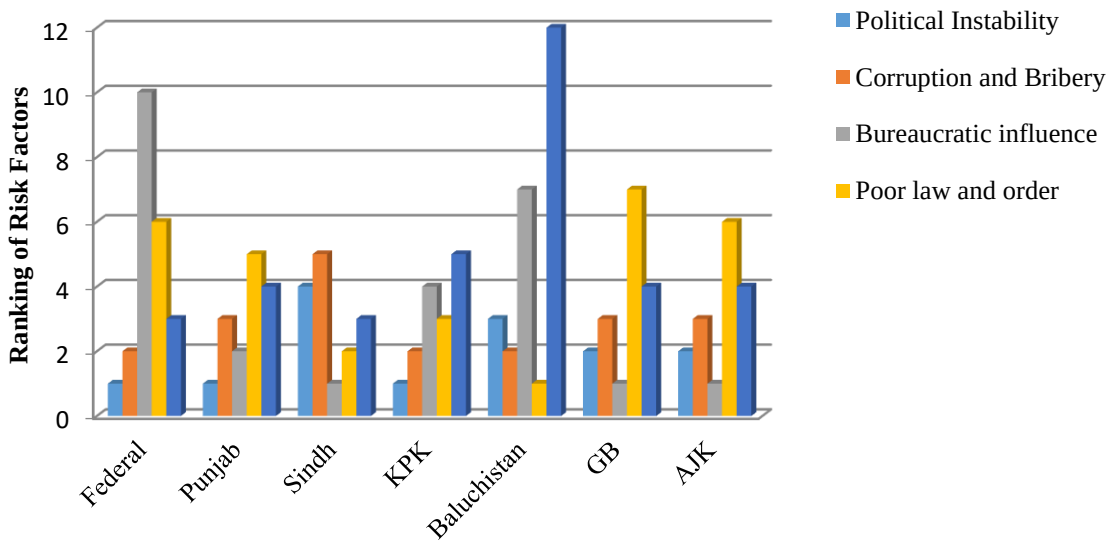

Figure 4.2: Comparison of "Top Five Risk Factors" among various Provinces

4.6 Comparison of Risk Rankings among Public, Private and Academic Sectors

Public, private and academic sectors related to P3 constructional projects in Pakistan are the main key players, who can practically assess the P3 risks as per their experience and perception. Out of 151 valid responses received from all over the country for data analysis, 57 (37%) belonged to public sector, 49 (32%) were private sector respondents and remaining 45 (30%) were academic sector respondents. To find out the P3 risk assessment perception or harmony among various groups of respondents, first of all each group assessment was measured separately in their own province/part of the country on the basis of values of risk probability and risk impact as shown in "Appendix V". Then the data of all provinces were combined together for public, private and academic sectors to find out their prioritization and ranking of various P3

constructional risks. On the final stage, the comparison was made between various groups in assessing top ten risk factors only which can make considerable influential effect on the execution of P3 constructional projects in Pakistan.

Considering the top ten risk factors, it was found that there was not much difference in the level of perception between various categories of respondents in the ranking of these top priority P3 constructional risk factors. Figure 4.3 shows the comparison of risk probability values assigned by the public, private and academic sectors from all over the country. It can be seen that respondents from all sectors unanimously considered the probability of occurrence of *political instability* risk as number one P3 constructional risk factor in Pakistan. Similarly it can also be judged that public, private and academic sectors contribute different opinion in visualizing the probabilities of occurrence of various P3 risks. For example if probability of occurrence of "bureaucratic influence" risk is considered, it is 5th prioritized risk by public sector while for private and academic sectors it is 4th and 3rd risk factor respectively. Which shows that academic sector seems to be more worried about the occurrence of bureaucratic influence risk on the P3 constructional project than public and private sectors. Overall this risk has been ranked at third position out of 42 risk factors. Figure 4.4 is regarding the comparison of assigning risk impact values to

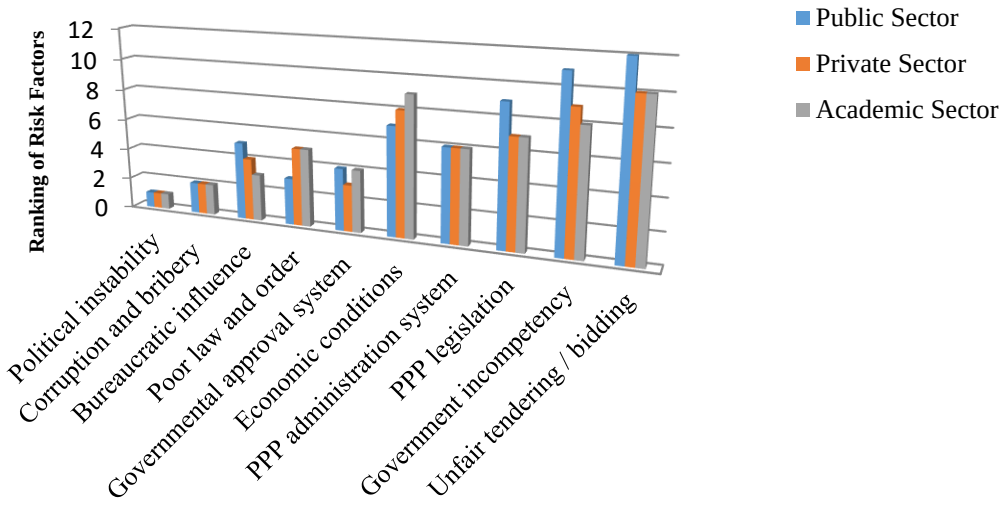

Figure 4.3: Comparison of Risk Probability Values of Top Ten Risk Factors among Public, Private and Academic sectors

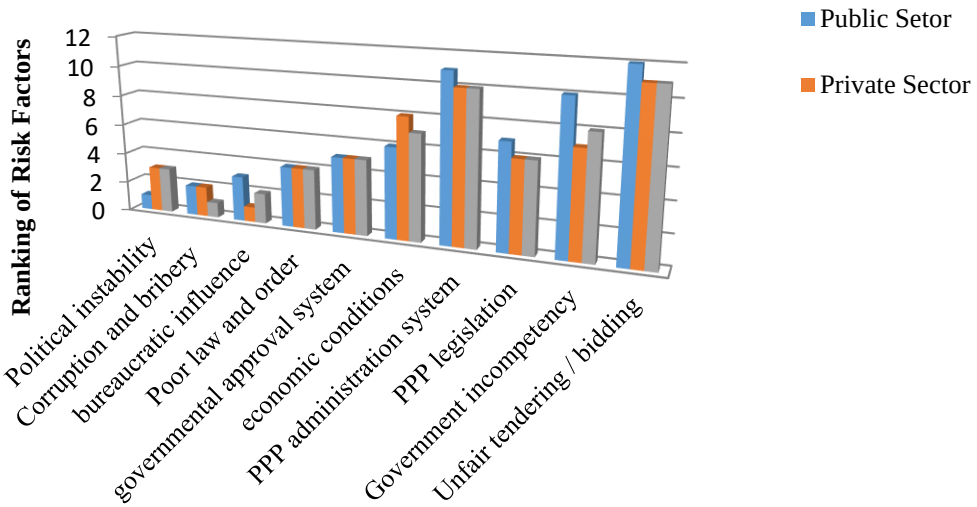

Figure 4.4: Comparison of Risk Impact Values of Top Ten Risk Factors among Public, Private and Academic sectors

top ten risk factors by the public, private and academic sectors. No major difference in the level of perception between various respondent groups was noticed and it was also observed that respondents considered risk impact value in relation to its probability of occurrence value i.e. risk factor with a higher probability of occurrence also had higher impact value except for some odd risks.

4.7 MANN- WHITNEY U Test

To find out the significant statistical difference between the perceptions of public and private sectors and between public and academic sectors and between private and academic sectors in ranking of various P3 constructional risk factors of Pakistan, Mann- Whitney U Tests were performed on the received data as similar technique has been used to compare the perceptions of various independent respondents in China (Albert P. C., 2011). Mann Whitney U Test is a non-parametric test and belongs to a version of independent samples t-test and is performed on the ordinal data in a hypoResearch Work testing situation. It tests whether two independent samples represent two populations with different median values (Sheskin, 2007). If the result of Mann Whitney U Test comes to be significant than it shows that there is significant statistical difference between the medians of two independent samples.

To check the statistical difference in ranking of 42 P3 constructional risk factors by Public, private and academic sectors of Pakistan, Mann Whitney U Tests were performed between public and private sectors, private and academic sectors and public and academic sectors as shown in "Appendix IV". The null hypoResearch Work (Ho) was considered as that there would no difference in the ranking/perception of two independent sectors and alternative hypoResearch Work (H1) was

considered as that there would be a significant difference in the perception of two groups at alpha level (α) equal to 0.05. Z distribution (z) two-tail test was used where if "z" was less than -1.96, the null hypoResearch Work would be rejected.

The summary of Mann Whitney U Test statistics is shown in Table 4.3, which highlights that there were 12 risk factors between public and private sectors; 6 between private and academic sectors and 11 between public and academic sectors which had significant statistical difference between their medians which can also be judged through the mean rank values of respective group. It can be interpreted from the results that there is a considerable difference in ranking and perception in judging P3 risk factors by the public sector especially in relation to private and academic sectors. As far as the "Top 15 Risk Factors" were concerned, it was observed that all sectors i.e. public, private and academics were agreed on the ranking of these risk factors and there was no difference in their perception for judging these P3 risks except for only two risk factors i.e. force majeure and occurrence of dispute associated with public and academic sectors, which showed different medians with varying mean rank values. In case of force majeure risk, the mean rank value of public sector was 94.79 and same value for academic sector was 112.27. This indicates that academic sector perceived that force majeure risk is more important to handle on the P3 constructional project than public sector believes. It is also believed that academic sector behaves neutral in the judgment and in Pakistan they are more associated with P3 research and analysis, therefore, their rankings are considered to be reliable.

As per Mann Whitney U Test statistics, Academic sector showed considerable differences in rankings of P3 risk factors and there were significant differences in the medians of overall 17 risk factors with private and public sectors; out of which six risk factors were associated with private sector and eleven were with public sector as shown in Table

4.3. Risks related to environmental issues and operational/maintenance cost overrun on the P3 project were most statistically different in rankings between academic and private sectors with "z" value equal to -2.893 and -2.557 respectively. Similarly P3 constructional risks of government amendments pertaining to economic regulations and unforeseen weather conditions between public and academic sectors showed high difference in their median values i.e. -2.684 and -2.667 respectively.

S/No	**Public and Private Sectors**	**Private and Academic Sectors**	**Public and Academic Sectors**
1.	Failure to perform as per specifications	Constructional cost/time overrun	Design changes during construction
2.	Constructional cost/time overrun	Poor quality of workmanship	Poor transportation facilities availability
3.	Incompetent and inexperienced partner	Operational/maintenance cost overrun	Government amendments pertaining to economic regulations
4.	Poor quality of workmanship	The occurrence of constructional faults	Fewer consumers avail the facility
5.	Less consumers avail the facility	Environmental Issues	Lower revenue collection than anticipated
6.	Operational/maintenance cost overrun	People Rehabilitation Issues	Unclear dispute resolution methods available
7.	Poor management abilities		Insufficient P3 supportive legislation
8.	Occurrence of constructional faults		Occurrence of dispute

9.	Lower revenue collection than anticipated		Coordination among government departments
10.	Residual risk		Force Majeure
11.	Unforeseen weather conditions		Unforeseen weather conditions
12.	Environmental Issues		

Table 4.3: Summary of Mann Whitney U Test Statistics

4.8 Preferred Risk Allocation of P3 Constructional Projects of Pakistan

For each risk, three options were given to the respondent for its appropriate allocation.

a. The risk that should be allocated to public sector (government).
b. The risk that should be allocated to private sector (private company, financers, insurers)
c. The risk that should be shared between public and private partners.

The basic principle criterion selected for the allocation of risk between public or private partners was kept as the risk should have ≥50% of respondent support for its allocation to some particular option. If respondent support was below 50% then that risk was considered as negotiable between partners. As shown in Figure 4.5, 36 risk factors got more than 50% of respondents support whereas only six had less than 50% of support. Table 4.4 indicates the results pertaining to respondent perception of allocating 42 P3 constructional risk factors among above

mentioned three options across the country where respondents showed considerable variation in their judgment process.

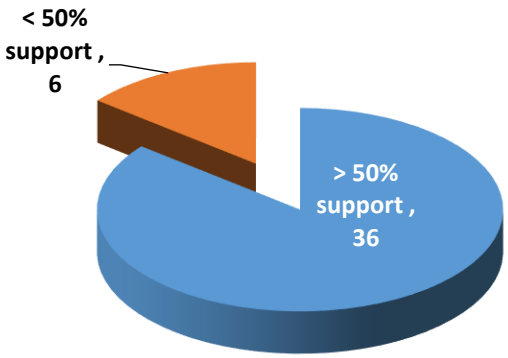

Figure 4.5: Respondents Support towards Allocation of P3 Constructional Risk Factors

Table 4.4: Risk Allocation of P3 Constructional Risk Factors in Pakistan.

S/No	Risk Factor	Group	Public (%)	Private (%)	Shared (%)	Preferred Allocation
1.	Government incompetency	Political	83	3	14	To Public
2.	Political instability		72	11	17	"
3.	Corruption and bribery in govt. offices		52	25	23	"
4.	Poor law and order situation		63	17	20	"
5.	Strong bureaucratic influence		75	9	17	"
6.	Weak government administration system to support P3	Construction	74	11	15	"
7.	Failure to perform as per specifications		20	67	13	To Private
8.	Constructional cost/time overrun		8	71	21	"
9.	Incompetent and inexperienced partner		23	28	50	Shared
10	Acquisition of land		72	5	23	To Public
11	Price escalation of construction material		17	32	50	Shared
12	Poor quality of workmanship		7	81	11	To Private

13	Design changes during construction		25	39	36	Shared
14	Poor transportation facilities availability		50	11	39	To Public
15	Interest rate fluctuation	Financial	16	60	25	To Private
16	Financing risk		13	42	45	Shared
17	Bankruptcy of partner		15	56	30	To Private
18	Poor economic conditions of the country		26	14	60	Shared
19	Government amendments pertaining to economic regulations		64	7	30	To Public
20	Less consumers avail the facility	Operational	33	32	34	Shared
21	Operational/maintenance cost overrun		7	79	13	To Private
22	Poor management abilities		9	72	20	"
23	The occurrence of constructional faults		11	76	13	"
24	Lower revenue collection than anticipated		31	17	52	Shared
25	Residual risk		12	65	23	To Private
26	Unfair tendering/bidding process (Favoritism)	Legal	72	15	13	To Public
27	Failure in approval agreement		41	14	45	Shared
28	Unclear dispute resolution methods available		30	13	57	Shared
29	Insufficient P3 supportive legislation		69	11	21	To Public
30	Lengthy Court procedures		26	11	62	Shared
31	Changes in government laws and regulations		72	2	26	To Public
32	Occurrence of dispute		20	19	62	Shared
33	The complex government approval system		52	13	35	To Public
34	Coordination among government departments	Relationship	34	16	50	Shared
35	Lack of commitment from either partner		23	26	51	"
36	Local people opposed to the project		36	24	40	"
37	Relationship of the federal and provincial government		60	5	35	To Public
38	Force Majeure	Natural /Social	37	11	52	Shared
39	Unforeseen weather conditions		14	51	35	To Private
40	Environmental Issues		15	60	25	"
41	People Rehabilitation Issues		79	0	21	To Public
42	Unforeseen Geotechnical conditions		18	58	24	To Private

4.9 Risks to be allocated to the Public Sector

Out of 42 P3 risk factors which were given to respondents for their appropriate allocation for the successful execution of P3 constructional projects in Pakistan, 15 risk factors got the highest percentage across the country from various respondents for their allocation to the public sector as shown in Table 4.4. Respondents unanimously considered that all political category risk factors i.e. government incompetence, political instability, corruption and bribery in the governmental offices, poor law & order situation in the country and Strong bureaucratic influence should be handled by public sector only who can manage them effectively at low costs in a better way than allocated these risks to private sector as shown in Figure 4.6. Survey results also showed that respondents were more interested in allocating four out of eight legal risk factors including unfair tendering / bidding process, insufficient P3 supportive legislation, changes in government laws and legislations and complex government approval system to the public sector. Therefore respondents clearly allocated major portion of political and legal risks to public sector and all risk factors allocated to public sector got more than 50% of respondents support.

4.10 Risks to be allocated to the Private Sector

Total of thirteen risk factors was allocated to the private sector by the respondents from Pakistan. Majority of risks belonged to constructional/management, operational and natural/social category. Risks associated with failure to perform as per specification, constructional cost/time overrun and poor quality of workmanship from constructional group were allocated to private sector who can manage

these risks more efficiently than public sector. Similarly four risk factors from operational, two from financial and three from natural/social category were also allocated to private sector by the respondents. All risk factors got more than 50% of respondents support except for one constructional risk i.e. design changes during construction which got 39% respondents support for its allocation to the private sector but from seeing the results of other options, this risk was allocated to both public and private sectors for its better handling. It is also important to mention here that respondents allocated 10 risk factors to public sector among "Top Fifteen Risk Factors" as shown in Figure 4.7.

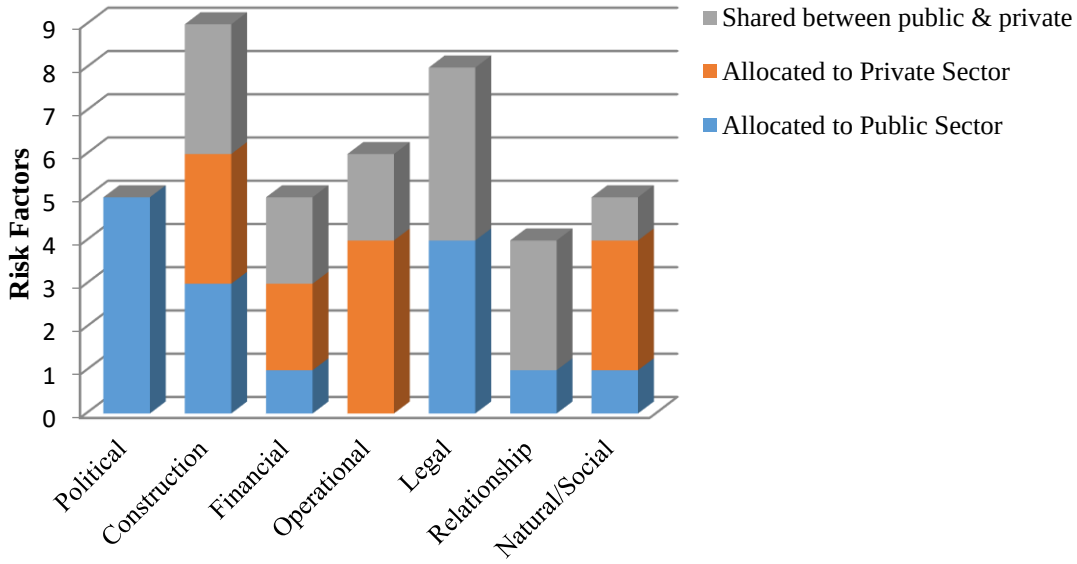

Figure 4.6: Allocation of P3 Constructional Risks among Public and Private Sectors in Pakistan

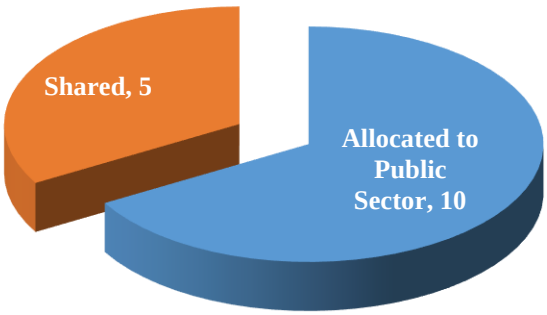

Figure 4.7: Allocation of "Top 15 P3 Constructional Risks Factors"

4.11 Risks to be shared by Public and Private Partners

Besides allocating P3 constructional risks to public and private sector individually, respondents across the country also proposed to share 15 risk factors out of 42 between public and private sectors for their better management by utilizing the responsibilities of both sectors in reducing the occurrence of risk consequences. Out of 15 risk factors, 11 had more than 50% of respondent support which also showed that respondents were more interested in the joint handling of risk factors rather than managing them individually by any one group on P3 constructional projects in Pakistan. Major risk factors which were proposed to be shared between public and private sectors belonged to legal, relationship and constructional/management categories. All 15 P3 constructional risks which were allocated to both public and private sectors by the respondents across the

country included inexperienced P3 partner, price escalation, design changes during construction, project finances, poor economic conditions of country, fewer consumers avail the facility during operational phase, lower revenue collection, failure in approval agreement, unclear dispute resolution methods available, lengthy court procedures, occurrence of disputes and relationship between project partners. Five risks including design changes during construction, less consumers avail the facility during operational phase, failure in approval of P3 constructional project agreement and local people opposition to project got less than 50% support from public, private and academic sectors. Therefore these risks were allocated to both public and private sectors for their better handling and management.

4.12 Differences in risks perception by different provinces

As shown in Table 4.5, there was total of 19 P3 constructional risk factors in which differences of opinion of public, private and academic sectors were found in allocating the risks. For example the public sector allocated the risk of "design changes during construction phase of P3 project" to private sector with 60% support, on other hand private sector allocated the same risk to both public and private sector with 41% support which is quite lower than the accepted percentage value, academic sector respondents also allocated the same risk to both partners i.e. public and private with 61% support which is higher than the previous respondents support. Finally the overall total percentages of same risk indicated that the risk should be allocated to the private sector with 39% support which was considerably lesser than any of the above-mentioned support. In this situation where risk allocation perception was based on

differences, the risk was allocated to both parties which were made responsible to share it with each other for its better management. But this was not the situation with every risk mentioned in Table 4.5, as 14 P3 constructional risks had supported more than 50% for their respective allocation out of 19 risk factors where respondents clearly indicated their allocation preferences.

Table 4.5: Differences in Risk Allocation Preferences

No	Risk Factor	Public			Private			Academics			Total		
		Public %	Private %	Shared %	Public %	Private %	Shared %	Public %	Private %	Shared %	Public %	Private %	Shared %
1	Incompetent and inexperienced partner	21	56	23	31	4	65	16	18	67	23	28	50
2	Price escalation of construction material	9	60	32	24	14	61	20	18	62	17	32	50
3	Design changes during construction	30	60	11	37	22	41	7	31	62	25	39	36
4	Poor transportation facilities availability	58	11	32	57	14	29	31	9	60	50	11	39
5	Financing risk	28	23	49	8	16	76	0	93	7	13	42	45
6	Bankruptcy of partner	9	61	30	29	24	47	7	82	11	15	56	30
7	Less consumers avail the facility	18	58	25	53	16	31	36	18	47	33	32	34
8	Residual risk	9	74	18	22	33	45	4	89	7	12	65	23
9	Failure in approval	35	14	51	57	12	31	31	16	53	41	14	45

	agreement												
10	Unclear dispute resolution methods available	5	18	77	31	8	61	60	13	27	30	13	57
11	Complex government approval system	26	7	67	65	10	24	71	22	7	52	13	35
12	Coordination among government departments	18	9	74	27	16	57	62	24	13	34	16	50
13	Lack of commitment from either partner	18	42	40	24	8	67	29	24	47	23	26	51
14	Local people opposition to project	9	25	67	57	16	27	53	31	16	36	24	40
15	Relationship of federal and provincial government	39	9	53	71	4	24	76	0	24	60	5	35
16	Force Majeure	23	21	56	65	0	35	24	9	67	37	11	52
17	Unforeseen weather conditions	7	70	23	24	18	57	11	62	27	14	51	35
18	Environmental Issues	9	84	7	14	16	69	24	76	0	15	60	25
19	Unforeseen Geo technical conditions	4	81	16	41	22	37	11	69	20	18	58	24

Finally as shown in Table 4.6, respondents allocated 15 risk factors to the public sector, 12 to private sector and 15 risk factors were proposed to be shared by the public and private sectors. The major portions of

political, constructional and legal risk factors were allocated to the public sector for better handling at lower costs.

Table 4.6: Summary of Risk Allocation of P3 Constructional Projects

S/No	Risk Category	Risk Allocated to			Total
		To Public	To Private	Shared	
1.	Political	05	-	-	05
2.	Construction / Management	03	03	03	09
3.	Financial	01	02	02	05
4.	Operational	-	04	02	06
5.	Legal	04	-	04	08
6.	Relationship	01	-	03	04
7.	Natural/Social	01	03	01	05
Total		15	12	15	42

4.13 Summary

The chapter describes various tests and procedures adopted for data analysis in detail in which normality, reliability and correlation of data were checked through SPSS program. Chapter also highlights the relationship between various provinces and public, private and academic sectors in the ranking of 42 P3 constructional risk factors in Pakistan. For ease of apprehension, the complex statistics of the surveyed data has been represented through various graphs, pie charts etc. in the chapter for better understanding.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Review of Research Objectives

The sub-objectives of the research study were:

a. Identification of risks factors associated with P3 constructional projects in Pakistan including all provinces/parts.
b. Carrying out a practical and reliable assessment of P3 constructional risks in Pakistan through an empirical survey.
c. Identifying the preferences of various provinces/parts of Pakistan in ranking of various P3 constructional risks factors.
d. Comparing the perception of various stakeholders i.e. public, private and academics associated with P3 constructional projects in Pakistan.
e. Finding out P3 constructional risks allocation preferences among various stakeholders through an empirical study.
f. Suggesting measures to improve P3 constructional risks assessment and allocation mechanism in Pakistan.

The 1st objective was achieved through an extensive study of literature review pertaining to P3 constructional risk factors across the world and

especially the P3 atmosphere of UK, India and China. 15 face to face interviews were also conducted in this regard across Pakistan from various P3 professionals belonging to all provinces/parts to find out their opinion towards various P3 constructional risk factors. Based on the literature review and interviews, 42 P3 constructional risk factors associated with Pakistan environments were identified for further empirical research study.

The 2nd objective was met by selecting 250 professional respondents from all over the country including all provinces/parts of Pakistan in a justified way. The respondents were divided into three categories i.e. public, private and academics to find out the reliable and practical assessment of risks. Finally the normality, reliability and correlation tests were carried out on the received data through SPSS program for further reliable analysis.

The 3rd and 4th objectives were achieved through carrying out of "Kendall Correlation (w)" and "Mann Whitney U Test" through SPSS program.

The 5th objective was achieved through conducting of an empirical survey based on the questionnaire from 250 professional respondents across the country divided into three categories i.e. public, private and academics.

The final 6th objective was completed through carrying out of the detailed analysis of data first and then incorporating the studied literature review and personnel interviews of P3 professionals with the respondent feedback.

5.2 Conclusion

The major findings of the study are:

a. The mean value of risk significance for each risk factor was calculated on the basis of associated risk probability and risk impact values. The ranking of various P3 construction risk factors in Pakistan was carried out through the mean value of risk

significance, which was calculated through the product of risk probability and risk impact:

Risk Significance = Risk Probability x Risk Impact

b. The *"Political Instability"* is top-ranked risk factor associated with P3 construction projects with the significance value of 17.43.

c. The second risk factor is *"Corruption and Bribery in Government Offices"* with the value of mean rating of risk significance equal to 17.27. The third risk factor is *"Strong Bureaucratic Influence"* with the value of 17.12. The fourth risk factor is *"Poor Law and Order Situation in the Country"* and the fifth is *"Complex Governmental Approval System"* with the values of 16.98 and 16.84 respectively.

d. Out of the top fifteen risk factors, five belong to political category, five belong to legal category, two belong to construction and financial category each and one belong to natural category of risk factors.

e. Among the top five risk factors, four belong to political category and one belongs to legal category of P3 risk factors.

f. The values of *"Kendall Coefficient of Concordance (w)"* for risk probability, risk impact and risk significance (risk probability x risk impact) for ranking of 42 risk factors are 0.839, 0.902 and 0.904 respectively. Which show that there is a significant agreement between the respondents in ranking of risk probability, risk impact and risk significance values.

g. The Mann Whitney U test statistics show that there is a significant difference between public, private and academic

sectors for the perceptions of all 42 risk factors for risk factors rankings related to P3 construction projects. There were 12 risk factors between public and private sectors and 11 between public and academic sectors which had significant difference of perception of ranking. This indicates the differences between public, private and academic sectors in judging various P3 constructional risk factors in Pakistan environments. Public sectors seem to have major differences with private and academic sectors in ranking of various P3 constructional risk factors, which may be due to less P3 constructional experience and practical knowledge of governmental officials.

h. Mann Whitney U Test statistics also show that academic sector showed considerable differences in rankings of P3 risk factors and there were significant differences in the medians of overall 17 risk factors with private and public sectors; out of which six risk factors were associated with private sector and eleven were with public sector. Risks related to environmental issues and operational/maintenance cost overrun on the P3 project were most statistically different in rankings between academic and private sectors with "z" value equal to -2.893 and -2.557 respectively.

i. The research study also reveals that respondents across the country allocated 15 out of 42 risk factors to the public sector, 12 to private sector and 15 risk factors were proposed to be shared between public and private sectors. Out of top 15 risk factors associated with P3 constructional projects of Pakistan, 10 were allocated to public sector for their better management and

five were recommended by the respondents to be shared between the partners, none was allocated to private sector. This means that public sector has to perform with great responsibility in handling and mitigation of top-ranked risk factors associated with P3 constructional projects of the country. The major risks which are allocated to public sector for better management belong to political and legal category while those allocated to private sector are from constructional, operational and financial category. The risks pertaining to relationship and natural/social category are preferred to be shared between public and private sectors.

5.3 Recommendations

For the successful assessment and allocation of P3 constructional project risk factors in Pakistan, the following recommendations are derived based on the data analysis and conclusions:

1. <u>Government-related</u>

a. The topmost priority should be given towards the preparation and approval of detailed and comprehensive "Pakistan Public-Private Partnership (P3) law" incorporating renowned economists, industrialists, educationists, judges and private sector representatives. It will help the government and private sector to build confidence and establish/understand their obligations and responsibilities right from the start without any dispute during the tendering, contract awarding, planning, designing, constructional and operational and transfer stages while handling P3 projects.

b. Development of effective, reliable and legal risk assessment and allocation mechanism by the federal and provincial

governments where all possible P3 constructional project-related risks may be addressed during the initial phase of the project incorporating all stakeholders' viewpoints.

c. Role and responsibilities of IPDF under Ministry of Finance may be enhanced through law at the national level and it should be made effective as a central legal regulatory body which should be monitoring all P3 constructional projects having worth more than Rs 2.5 billion.

d. All provinces to develop legal independent P3 units/authorities at a priority which should be responsible for the controlling and monitoring of the P3 constructional projects in the respective province under the guidance of Federal Planning Division, Ministry of Finance and IPDF.

e. All P3 governmental setups should have professional and competent engineers, financers, consultants and judges which may be selected on merit for the successful implementation of P3 projects in the best national interest.

f. IPDF under the guidance of Ministry of Finance and Planning Division may be made responsible for conducting of training workshops/seminars for provincial P3 officials and coordinate with them the modern trends of handling P3 projects.

g. Selection of competent, professional and character worthy government officials to handle P3 projects and related issues at government level.

h. Establishment of independent P3 anti-corruption authority under the ministry of interior at federal and provincial levels to

strictly enforce P3 laws and regulations on all stakeholders and also be able to perform quick decisions to punish defaulters.

i. Last but not least, to create politically stable environments in Pakistan and to attract the domestic and foreign investment in P3 projects, there is a requirement that federal and provincial governments should seriously understand the role of P3 in the development of national public infrastructural projects by keeping the examples of P3 in India, China, and the UK in front. It is responsibility of a government to create politically conducive environments in the country for investors by critically understanding the role of domestic media, political friendly culture, country's international image and setup of effective and legal P3 authorities at all level.

2. **Private sector-related**

a. Carrying out of thorough identification, assessment and allocation of risk factors associated with P3 construction projects by expert and professional P3 consultants during the initial planning phase of the project.

b. Visiting of the project site to access the practical assessment of different risk factors by keeping the project location, geography and local culture in mind.

c. Setup of P3 cell comprising of expert individuals for the handling of different issues during the project implementation phase.

5.4 Knowledge Contribution

Effective and reliable risk assessment and allocation mechanism among various stakeholders is very necessary for the implementation of P3

constructional projects in Pakistan where P3 model is already in the basic development stage comparing with India and China in the region. Unlucky very few empirical research works are available on the subject in the country. This research study enables Pakistan federal and provincial governments and private sector parties to understand the importance of carrying risk assessment and allocation at the initial phase of the feasibility study for the successful implementation of P3 constructional projects. It also assists in development of risk management model for the future P3 projects in Pakistan. The research study also provides federal and provincial governments to know the top important risk factors associated with the successful implementation of Pakistan P3 model in future and to address the existing weaknesses in this regard.

5.6 Recommendations for Future Research

The research study may be repeated on a provincial level independently with larger population size covering various areas and cities of the respective province as Pakistan provinces are considerably different from each other in terms of geographical and cultural atmosphere for undertaking P3 constructional projects. It is also recommended that future research studies may be limited to any one of the categories of risk factors i.e. political, legal, financial, operational etc. to understand effects of various risks factors linked with that category in a more deliberate way. Future research may also be carried out on the assessment and allocation of P3 constructional risks pertaining to different types of P3 models i.e. concession, management and lease contract etc. Future research may be carried out on the development of easy, reliable and workable risk assessment and allocation model for undertaking the P3 constructional projects at various locations in Pakistan.

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